TECHNOLOGY DEPT.

the OIL AND GAS JOURNAL

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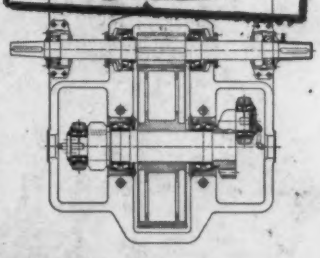
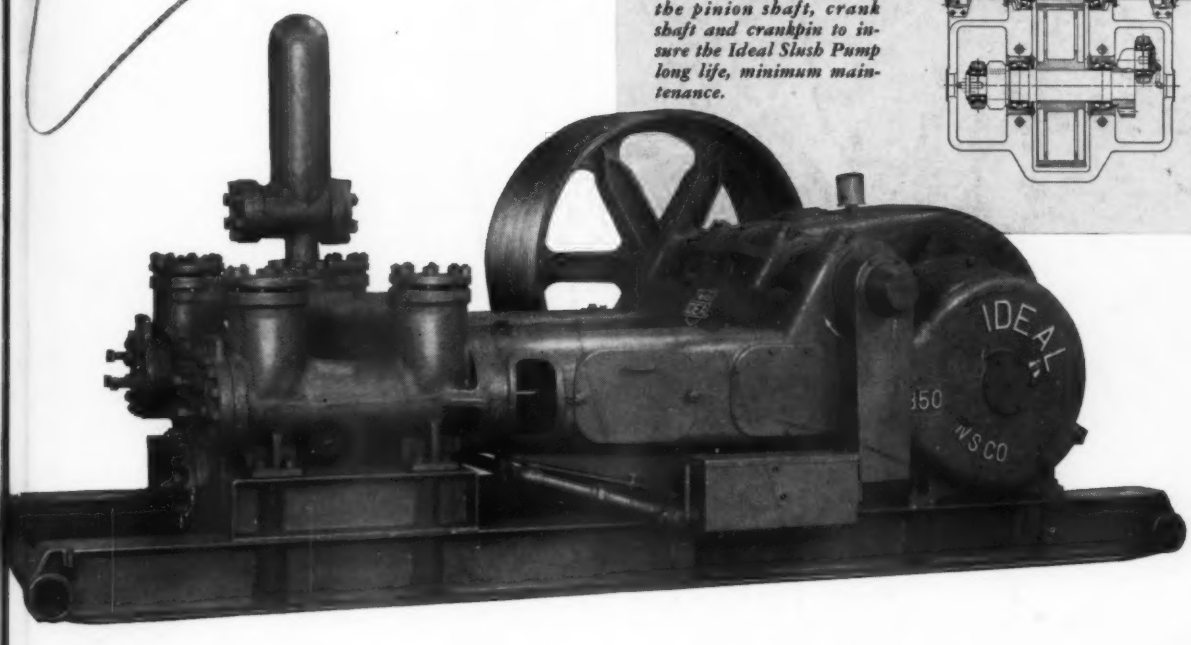
DETROIT

How **THE NATIONAL SUPPLY COMPANY** *uses Timken bearings on the pinion shaft, crank shaft and crankpin to insure the Ideal Slush Pump long life, minimum maintenance.*





ow TIMKEN® bearings keep a mud pump from bogging down

THE NATIONAL SUPPLY COMPANY has designed its Ideal Power Slush Pump with an eye to long operation and low maintenance costs. With the pinion shaft, crank shaft and crankpin mounted on Timken® tapered roller bearings, trouble-free performance is assured.

Timken bearings keep gears and shafts in proper alignment, eliminating excessive wear on moving parts. Lubrication time is reduced because Timken bearings permit tighter, lubricant-retaining closures that keep out damaging dirt and moisture.

Timken bearings have extra load-carrying capacity due to the line contact between the rollers and races. Friction is virtually eliminated by the true rolling motion and precision surface finish of Timken bearings. And tapered design enables them to carry any combination of radial and thrust loads.

No other bearings give you *all* the advantages of Timken bearings. Insist on Timken bearings in the machinery you buy, and make certain Timken bearings are in the equipment you build. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

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TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳

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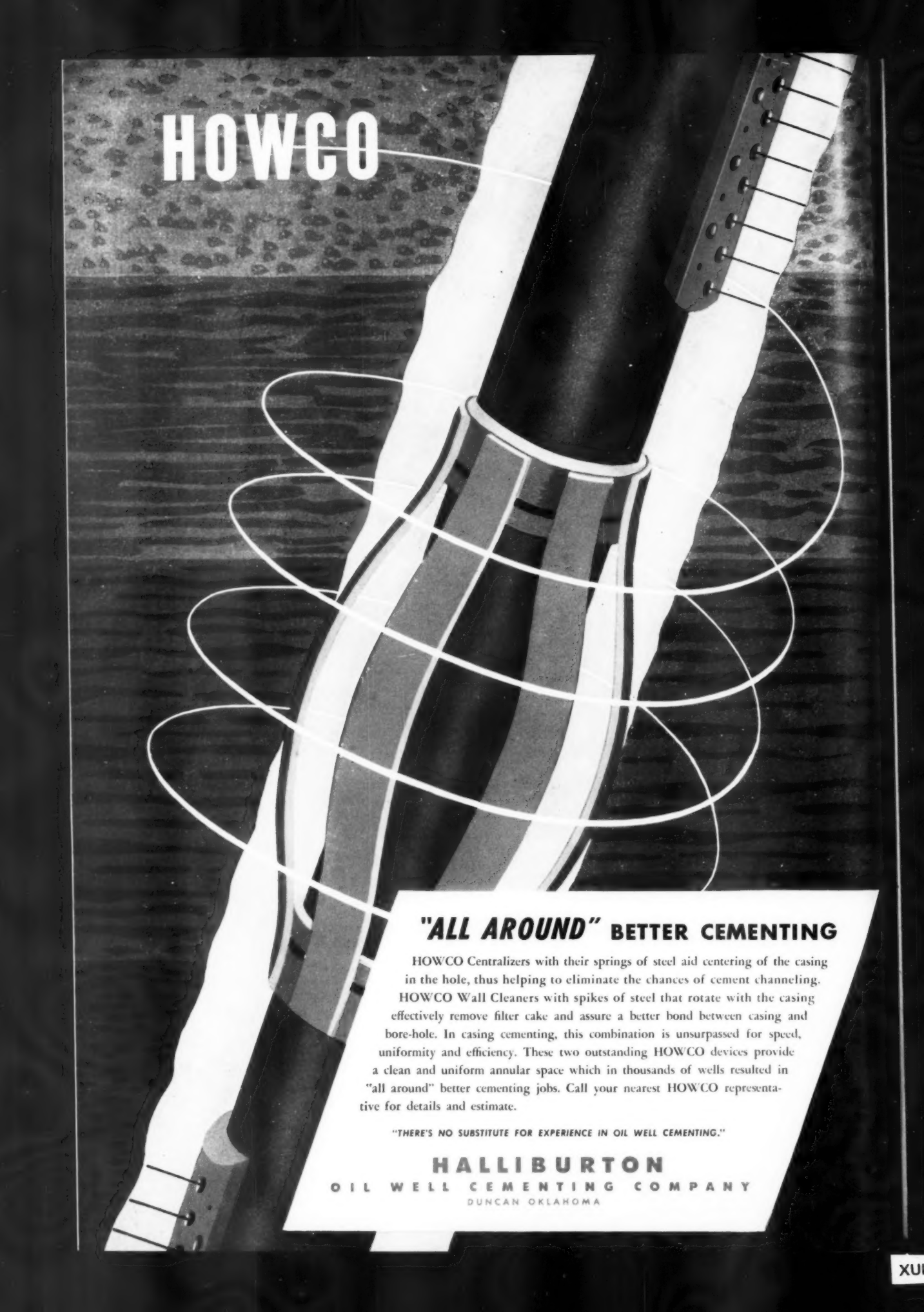

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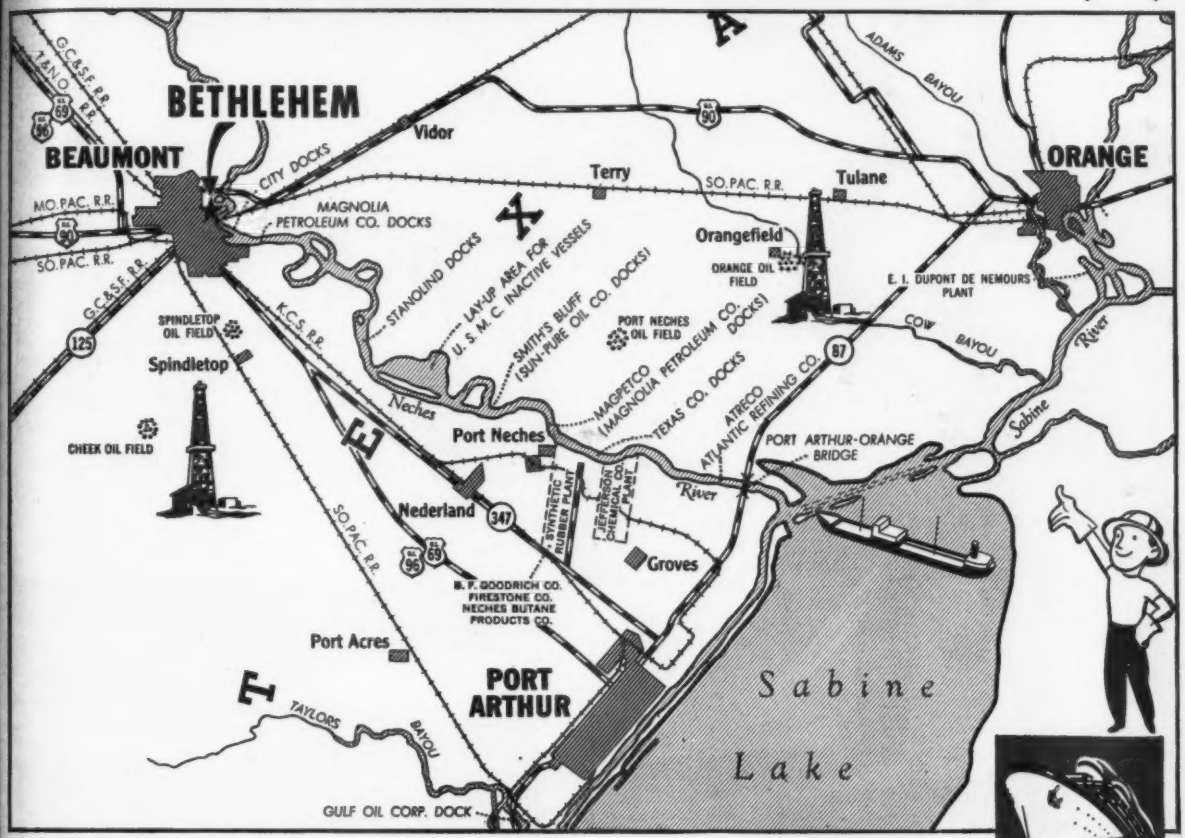

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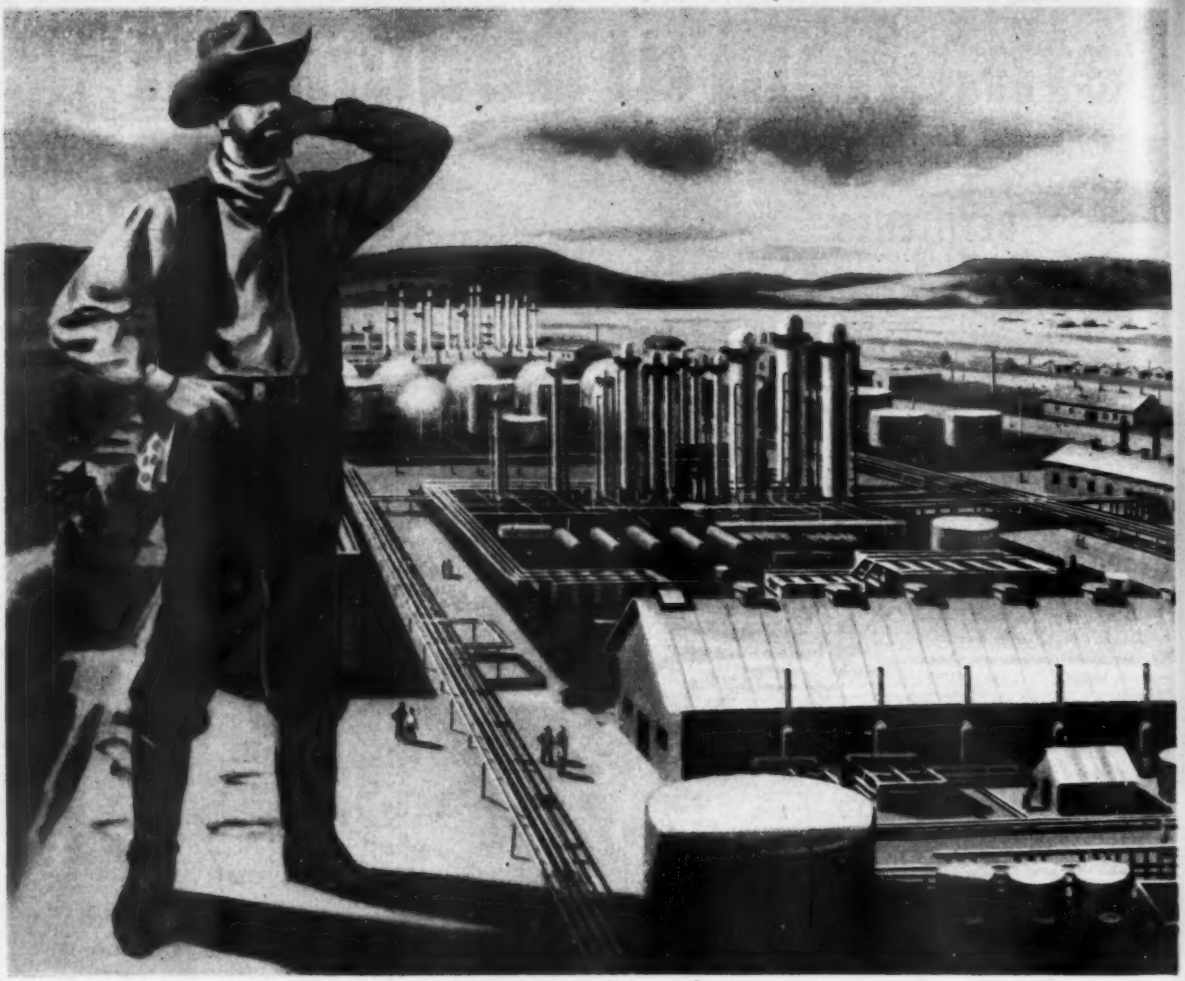

"Gad," said Kent Morgan, "my tall tales didn't compare to this progress"

Kent Morgan, romanticist, bard, teller of tall tales, in the early days of the great Southwest, would agree that the past half century has seen the Southwest emerge as the largest industrial area in the United States. Vast natural resources, assured low-cost power, temperate climate, and centrally located for low-cost distribution, an area offering management the geographical area ideal.

If your organization's plan includes capitalizing on the vast resources of the Southwest . . . it will benefit you to take advantage of Brown & Root's years of experience in this territory. A complete knowledge of soil, terrain, and climatic conditions may result in faster, more economical completion of your contemplated project. A request from you will put Brown & Root consultants at your service.

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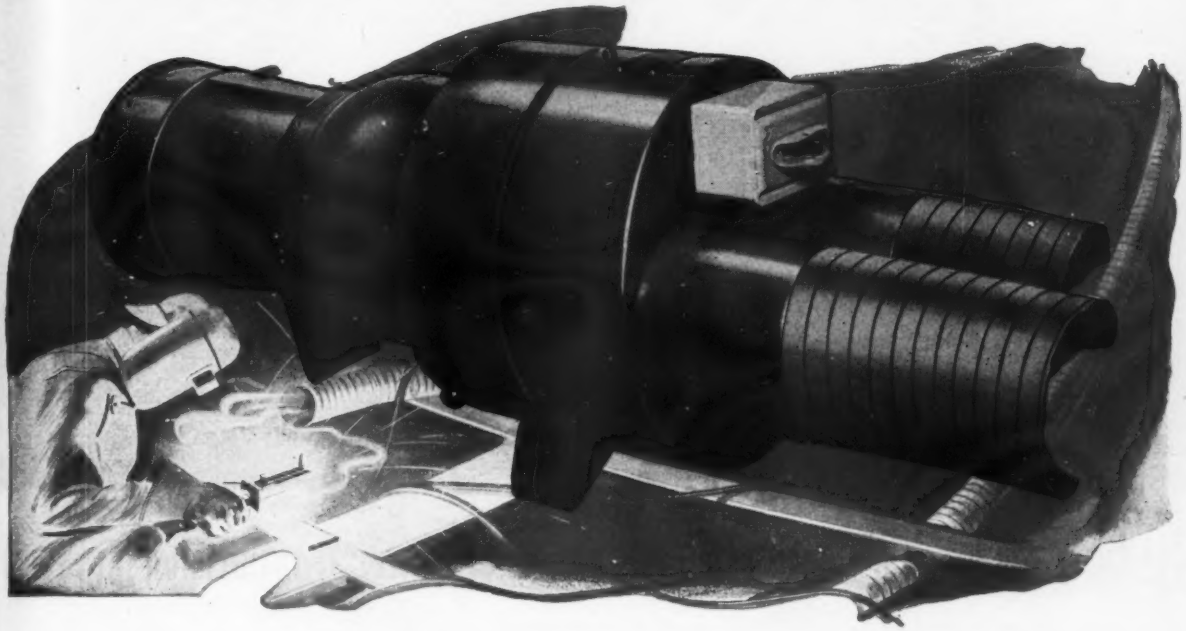

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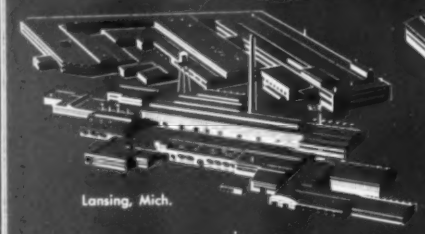
Spicer has eight great and modern production plants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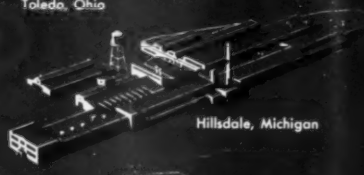
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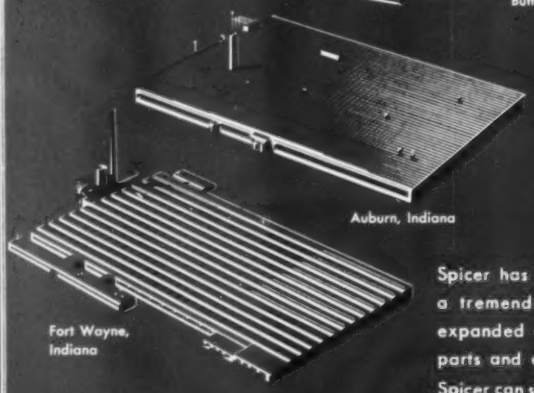
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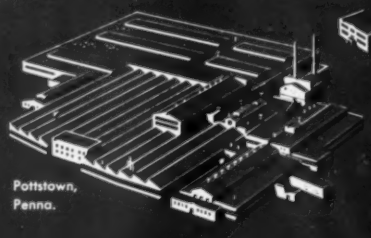
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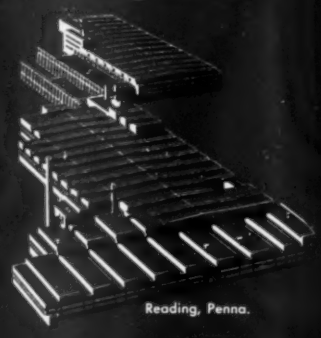
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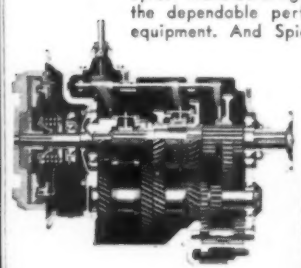
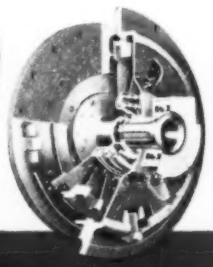
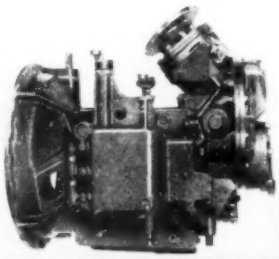
Spicer has grown up with the automotive industry... has a tremendous stake in its welfare and progress... has expanded steadily through the years to supply essential parts and equipment when and where they are needed. Spicer can serve you better through these 8 efficient plants.

Spicer has the most complete range of power transmission products

Spicer ingenuity has developed the most comprehensive group of units of their type available from a single source. Spicer manufacturing excellence assures the dependable performance of this equipment. And Spicer management—long renowned for the strength and stability of its policies—assures the continuance of Spicer quality standards. Spicer can serve you more fully, completely, dependably!







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5 times-plus longer service

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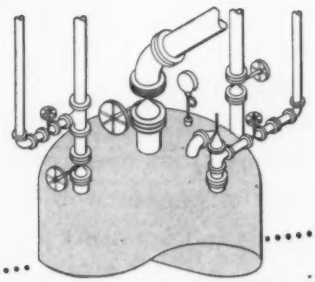
CRANE VALVES



PROBLEM: To find a better replacement for valves that needed repairs every 2 to 3 weeks and failed completely in 3 to 4 months.

WORKING CONDITIONS: Valve exposed constantly to hydrochloric acid vapors at 50 psi, at approximately 280° F., while controlling raw material inlet line to starch converter.

SOLUTION: Crane No. 1671 Ni-Resist Cast Iron Gate Valve with Crane 18-8 Mo Alloy trim.

RESULT: On last inspection, after 19 months' service without one single interruption, Crane Ni-Resist valves were still in very good condition.

Here's an example of the long life and low-cost maintenance that make Crane Quality the best value in all types of valves.

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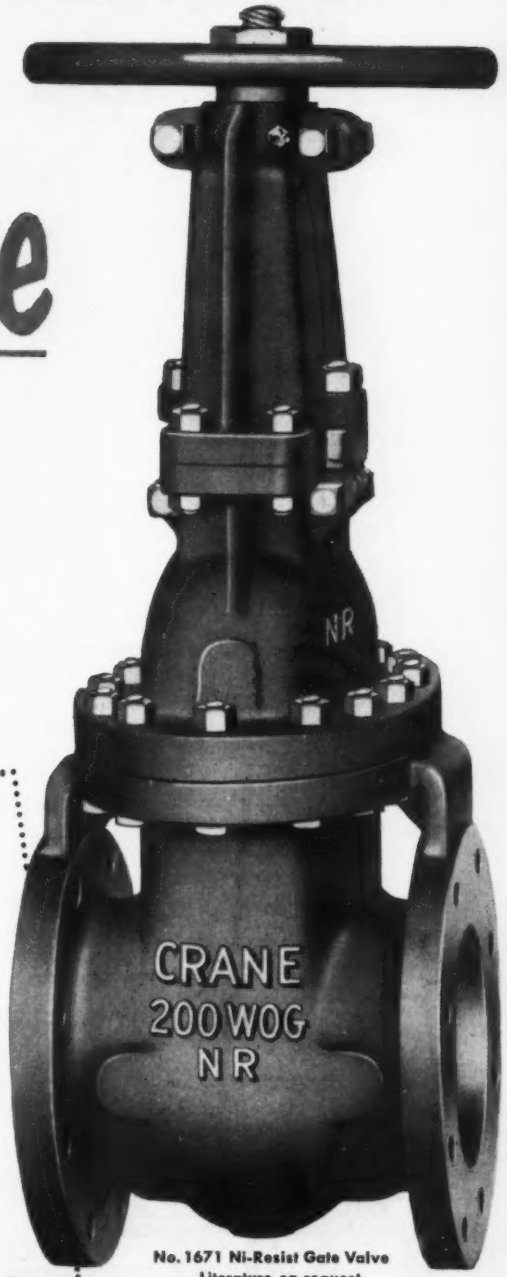

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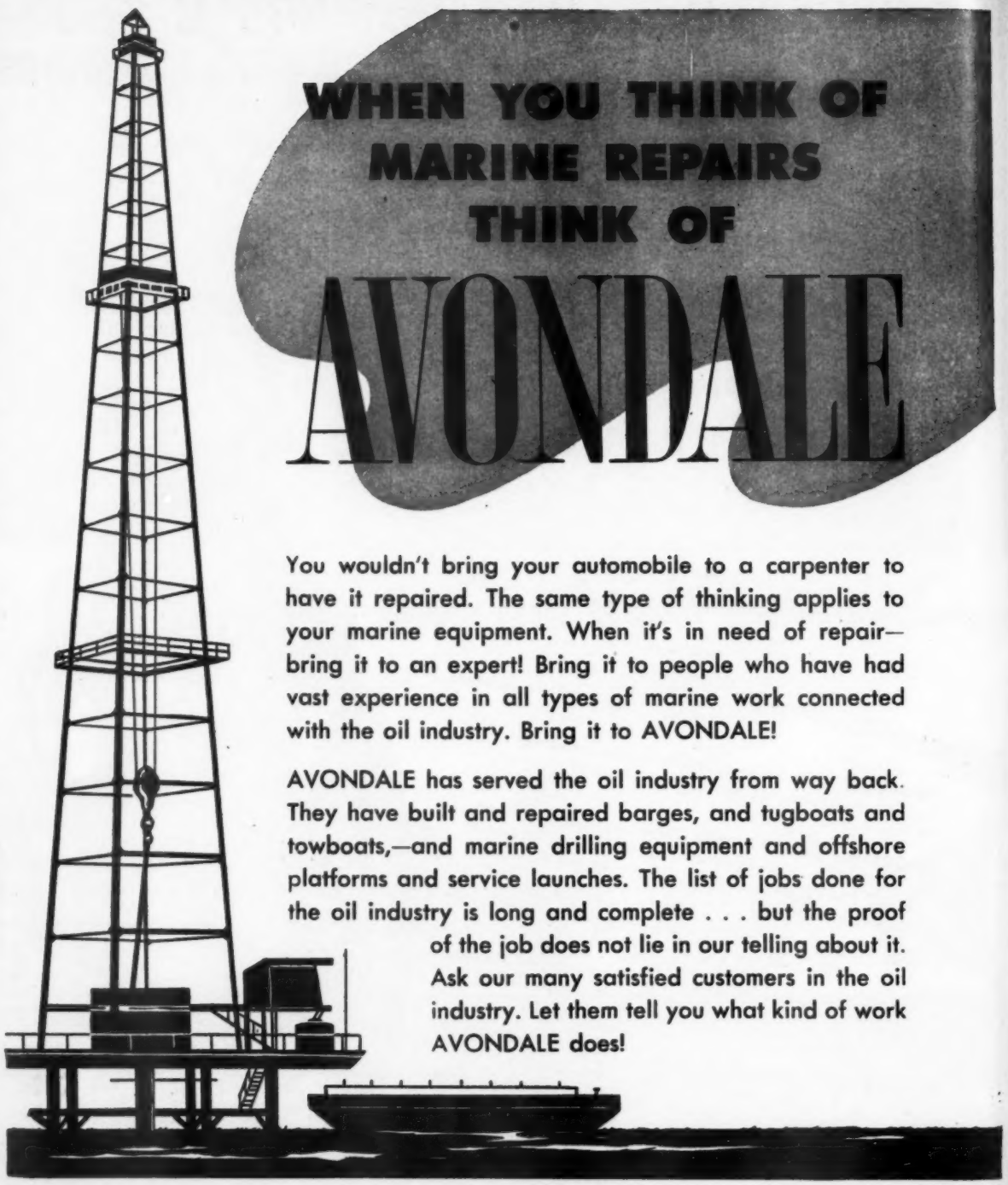

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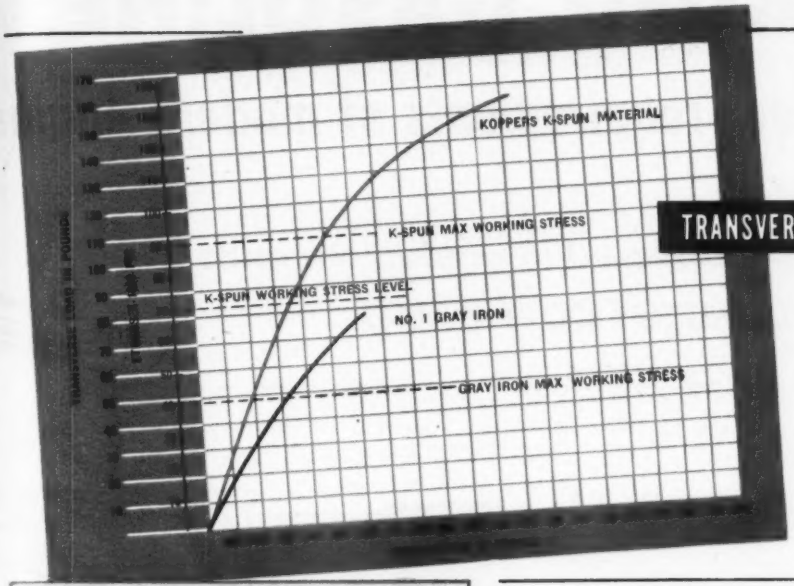


TRANSVERSE STRESS CHART

HERE ARE THE AMAZING RESULTS OF ACTUAL LABORATORY TESTS COMPARING ORDINARY GRAY IRON WITH KOPPERS K-SPUN, *THE MIRACLE METAL!*

Koppers K-Spun material shows a maximum working stress of 90,000 psi, compared with a maximum working stress of *only 40,000 psi for ordinary gray iron piston ring material!* Note the difference in the slopes of the two curves, due to K-Spun's increased modulus. K-Spun's yield point, though approaching ultimate strength, is low enough to allow a small percentage of elongation, resulting in toughness and impact value *many times greater* than that of ordinary gray iron.

TABLE 1—TRANSVERSE MODULUS AND RUPTURE STRESS

Koppers K-Spun Material			No. 1 Gray Iron		
TRANSVERSE MODULUS at			TRANSVERSE MODULUS at		
40,000 # psi	60,000 # psi	90,000 # psi	40,000 # psi	60,000 # psi	90,000 # psi
22.0×10^6	20.6×10^6	18.6×10^6	12.4×10^6	10.8×10^6	.....
RUPTURE STRESS psi			RUPTURE STRESS psi		
130,000			67,000		

TABLE 2—HARDNESS, IMPACT AND TENSILE STRENGTH

Koppers K-Spun Material			No. 1 Gray Iron		
Hardness R_b	Impact in lbs.	Tensile Stren., psi	Hardness R_b	Impact in lbs.	Tensile Stren., psi
100-103	9.5- 9.5	75,400	102-104	2.5-3.0	42,000
99-100	11.0-11.5	72,900	103-104	2.5-3.0	40,000
105-106	7.0- 5.0	75,000	101-103	3.0-3.0	41,000
99-102	7.0- 8.0	79,100	103-105	2.5-3.0	42,000
98-100	8.5-10.0	76,500	104-105	3.0-3.0	42,300
103-104	6.0- 7.0	77,500	102-103	3.5-3.5	38,000
101-102	7.0- 8.5	78,000	104-105	2.5-2.5	40,000

POROUS CHROME PISTON RINGS

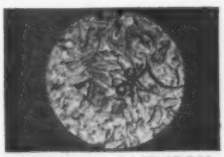
...another Koppers Exclusive!

Koppers Porous Chrome Rings reduce cylinder wall wear 50% or more by actual test! Famous Van der Horst Plating Process provides a porous chrome surface that distributes oil for better lubrication during break-in, wears down to perfectly seated solid chrome that gives up to four times as much service between overhauls! For gasoline and Diesel engines (on specification).

KOPPERS

IF you've had experience with Koppers American Hammered Rings in Diesel, steam or gasoline engines, you already have *proof of performance* of their superiority . . . now read for yourself these scientific facts and figures, verified by exhaustive laboratory tests . . . *positive proof that K-Spun Rings are 100% stronger, 50% more elastic, four times more shock resistant than ordinary ring material!* They're *guaranteed* not to break in installation or in service! Get the facts on Koppers Piston Rings today . . . write for complete information to: KOPPERS CO., INC., *Piston Ring Dept.*, 1650 Hamburg Street, Baltimore 3, Maryland.

K-SPUN IS AN ENTIRELY NEW, STRONGER KIND OF CAST IRON



ORDINARY CAST IRON

KOPPERS K-SPUN

These microstructures, magnified 250 times, show the basic difference between ordinary cast iron and Koppers K-Spun. Top photo shows individually cast gray iron, containing spiral flake graphite with long stringers in a fine pearlitic matrix. This fine flake graphite imparts to the metal many planes of weakness, causing low resistance to combustion shock.

Bottom photo shows K-Spun, cast by an exclusive centrifugal process. Note large nodular type of graphite formation and absence of stringers. Large graphite nodules eliminate the many planes of weakness inherent in most cast iron . . . double impact resistance and elasticity . . . increases wear resistance by far . . . in amazing Koppers K-Spun Piston Rings!

KOPPERS *American Hammered* PISTON RINGS

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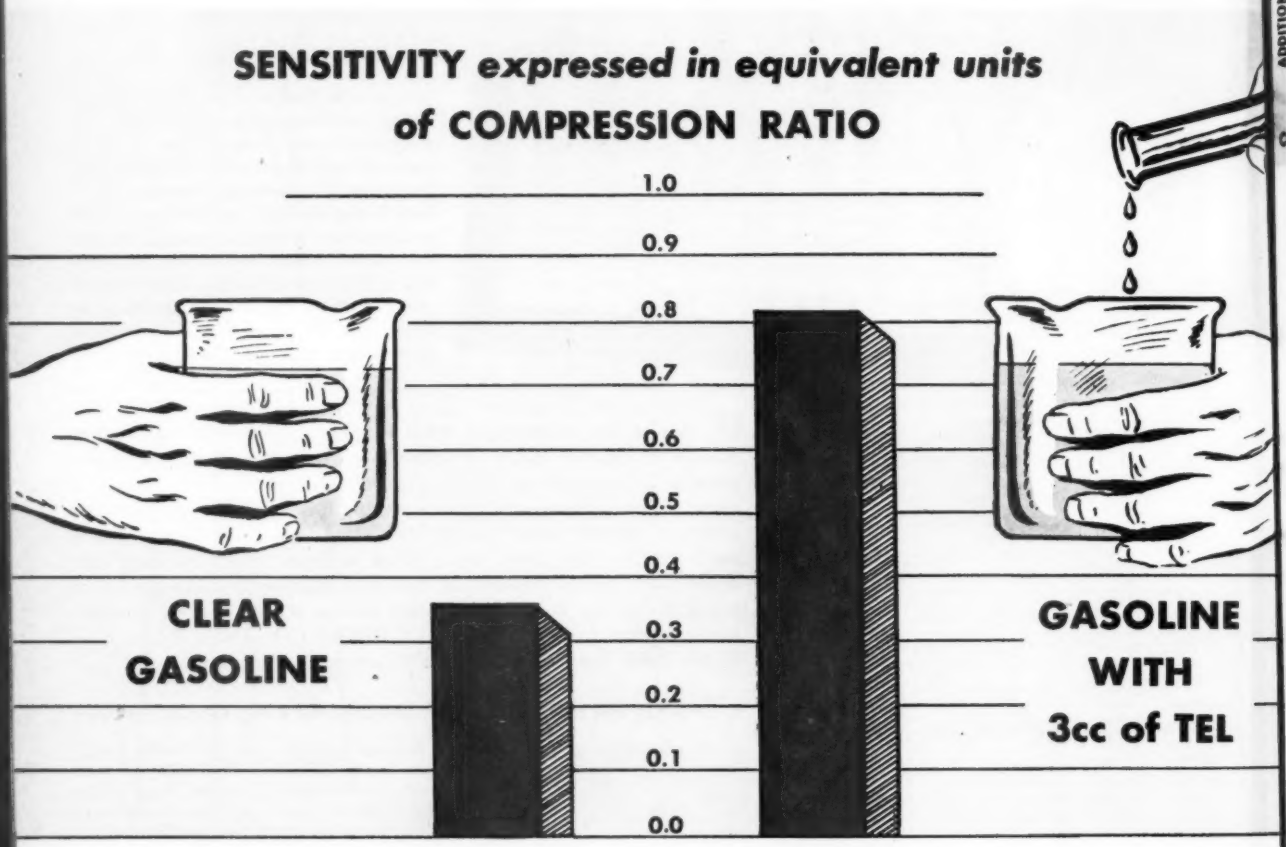
EXTRA "SENSITIVITY" OF LEADED GASOLINE

helps refiners meet requirements of modern engines



In the automobiles produced in the early 30's there was no particular advantage in using fuels whose Research ratings were substantially above their Motor ratings. However, designers of automotive engines have reduced the temperatures to which the fuel-air mixture is subjected in the intake manifold and cylinders and have made other changes which have increased the value of higher Research ratings.

Today, generally speaking, the higher the Research octane number of fuels having the same Motor Method rating, the better their performance on the road. The difference between these two methods of rating is often called "jump" and is one measure of fuel "sensitivity."

(Since "jump" is ordinarily expressed as octane units, the term "sensitivity" is used here to describe the same property of gasolines, expressed either as octane units or as equivalent units of compression ratio on an engine of good design.)

The effect of tetraethyllead on sensitivity

In tests of sixty-six regular and premium fuels the difference between the Research and Motor octane number was greater after the addition of 3.0 cc tetraethyllead in all except four of the fuels (Chart 1). The biggest improvement was 3.4 octane numbers; the average was 1.3.

While sensitivity is usually expressed in octane

FFECT OF 3.0 CC TETRAETHYLLEAD PER GALLON ON "SENSITIVITY" OF COMMERCIAL GASOLINES

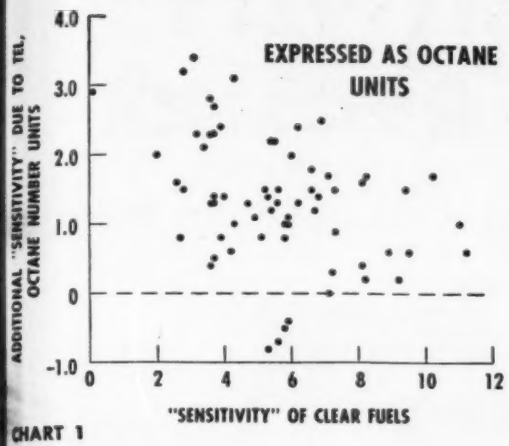


CHART 1

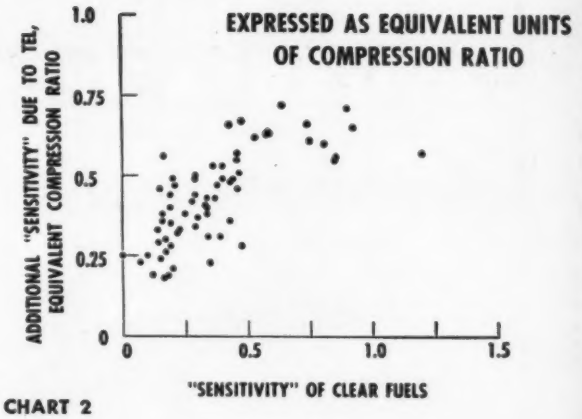


CHART 2

number units, a more realistic evaluation is obtained when it is expressed as equivalent units of compression ratio. This is true because of the non-linearity of the octane scale in terms of engine performance factors. Octane units get bigger and bigger toward the upper end of the scale.

Chart 2 shows that the additional sensitivity contributed by tetraethyllead (measured as equivalent units of compression ratio) is far greater than might be expected from the difference in sensitivity expressed in octane number units. Even the four fuels which have a negative improvement in sensitivity measured by octane units show a positive improvement expressed as equivalent units of compression ratio. In fact, on the average, the sensitivity of leaded fuels is more than twice the sensitivity of the clear fuels, expressed as equivalent units of compression ratio.

The greatest gain attributable to tetraethyllead is equivalent to 0.75 compression ratio; the smallest is 0.18 ratio; the average is 0.44 ratio. *In all the gasolines the sensitivity is greater with tetraethyllead than without it.*

Another important finding is shown in Chart 3—the higher the concentration of tetraethyllead, the greater the improvement in sensitivity expressed in terms of equivalent units of compression ratio.

An aid to meeting modern engine requirements

As automobile manufacturers have improved the design of engines by taking advantage of the sensitivity of motor fuels, any feasible method for improving fuel sensitivity without lowering the Motor Method rating has become of distinct advantage to the refiner. In this evolution, tetraethyllead has become increasingly valuable through its contribution to fuel sensitivity.

EFFECT OF TEL CONCENTRATION ON "SENSITIVITY" OF COMMERCIAL GASOLINES

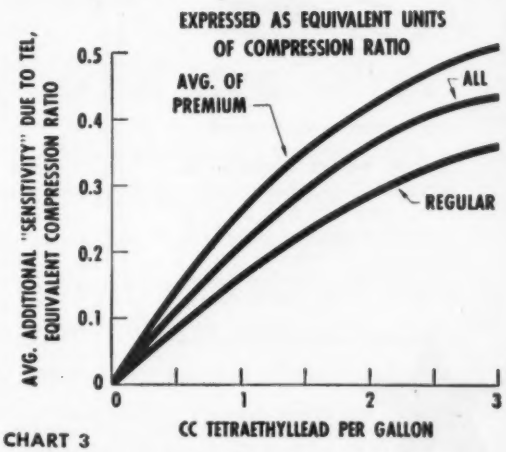
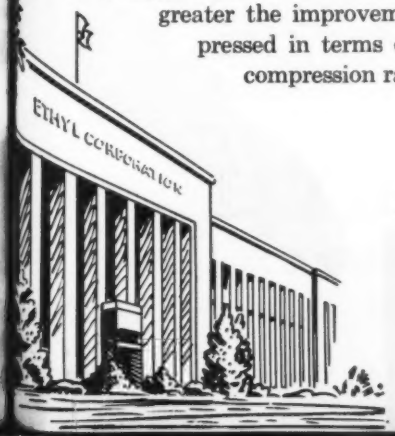


CHART 3



Over 400 specialists working full time on fuel and engine developments

ETHYL CORPORATION
RESEARCH LABORATORIES

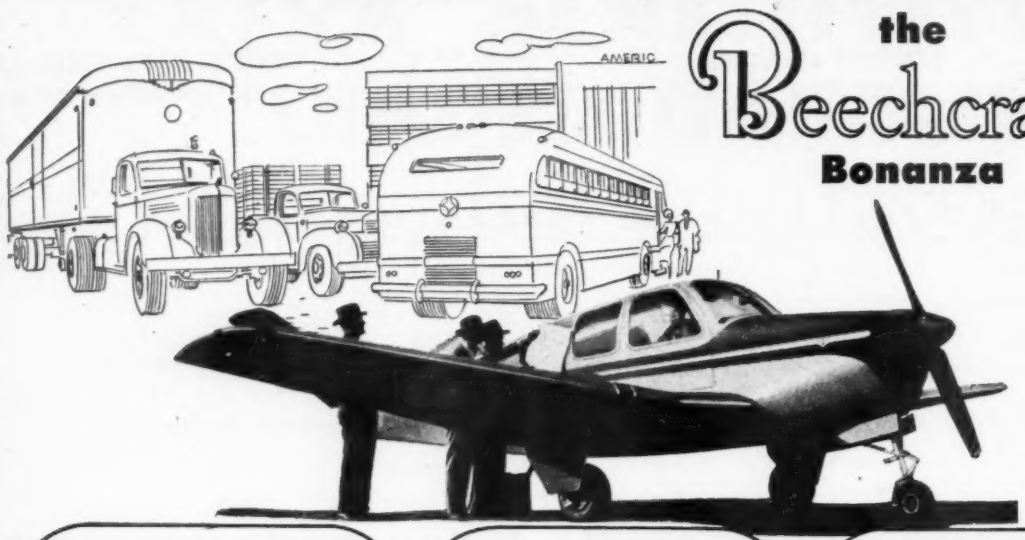
DETROIT, MICHIGAN
1600 West Eight Mile Road

SAN BERNARDINO, CALIFORNIA
2600 Cajon Road

XUM

Add this "expediter" to your transportation set-up:

the Beechcraft Bonanza



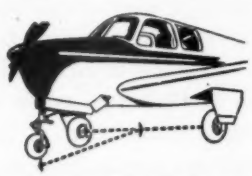
***Faster* trips.** Cruising at a 170-mph clip, your management men can spend *all* the time they need on "field work." You have complete mobility of action—the Bonanza is fully equipped for day and night flights.

. . . at *longer* range! 750-mile range can be lengthened to 940 or 1,145 miles with installation of 10- or 20-gallon auxiliary fuel tanks. In the Bonanza you can *keep moving* to your destination.

Travel in style—and comfort! The cabin is *soundproofed*, handsomely tailored, and *big*. Four ride in "stretch-out" comfort. W-I-D-E limousine-type door. Arm rests, ash trays for all. Three map pockets.

Takes short fields "in stride." Take-off horsepower rating now 196 h.p. at 2,450 rpm. Landing gear lowered in 7½ seconds, raised in 8½, at 105 mph. New Beechcraft propeller develops greater static thrust.

And just compare this economy! Fuel consumed at "passenger car" rate — 9.5 gallons per hour! Bonanza uses only 56% of engine's rated take-off horsepower at cruising speed. Less wear, fewer overhauls!



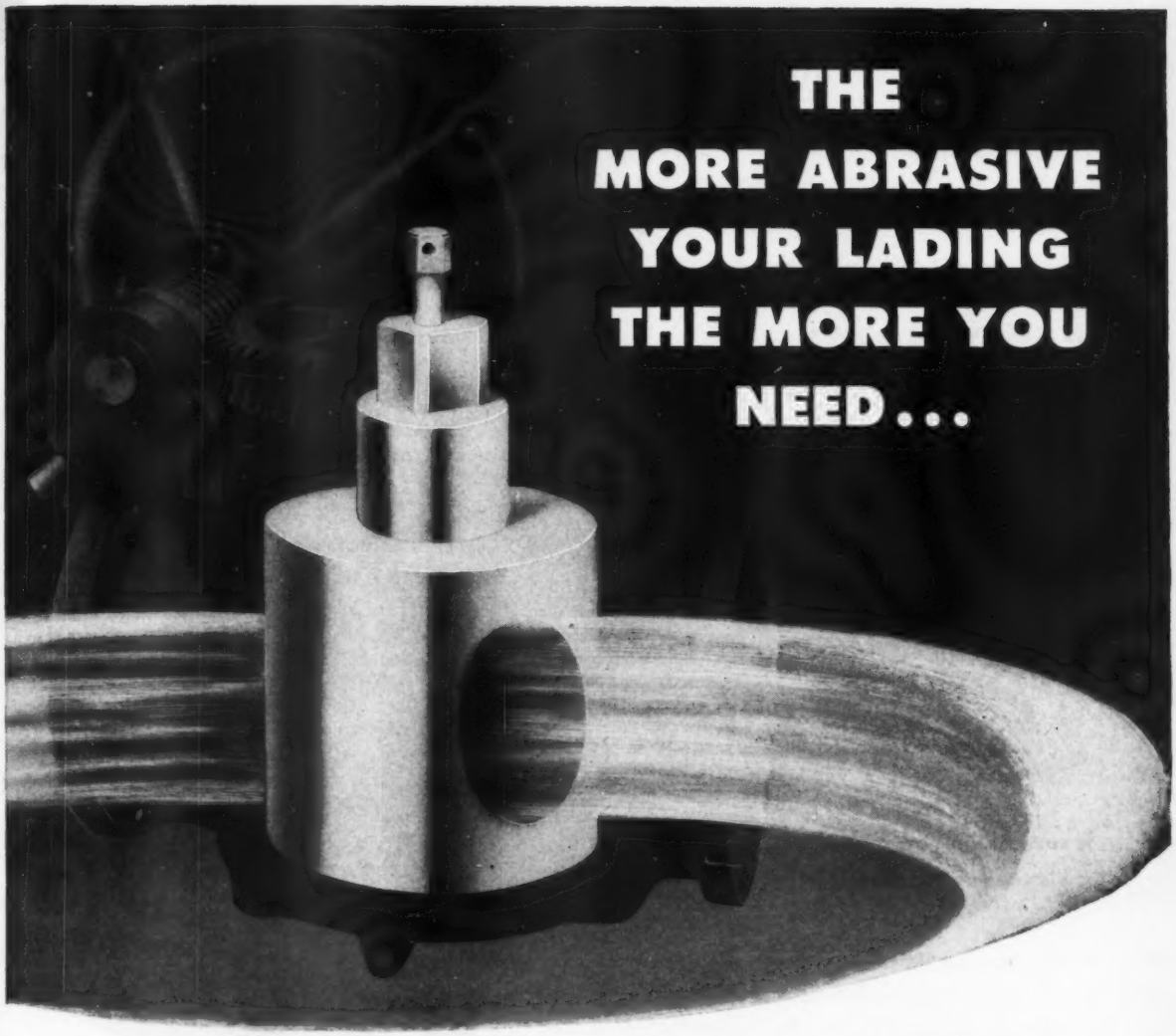
Unsurpassed *safety*. Steerable nose-wheel gives greater maneuverability, more positive control. Wide and long wheel base smooths rough field landings. All-metal framework far surpasses CAA requirements.

Features like these have put the Model B35 Beechcraft Bonanza 'way out in front! Get the *full* story about this sturdy, economical business plane from your nearest Beechcraft distributor or dealer today. Or write Beech Aircraft Corporation, Wichita, Kansas, U. S. A., on your company letterhead.

Top speed, 184 mph
Cruising speed, 170 mph
Range, 750 miles
Fuel economy, 9.5 gph

Beechcraft
BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS



a.c.f. cylindrical plug valves

They alone provide the full-pipe-area passage, and straight-through round* porting, that can banish abrasion troubles. Lubricant-sealed from contact with the lading, the precision-machined plug does not wear or need attention, other than an occasional turn of the lubricating screw. Why use less efficient valves?

*Also available with full-pipe-area rectangular port.

a.c.f. CYLINDRICAL FULL PIPE AREA LUBRICATED **PLUG VALVES**

Representatives in more than 50 principal cities

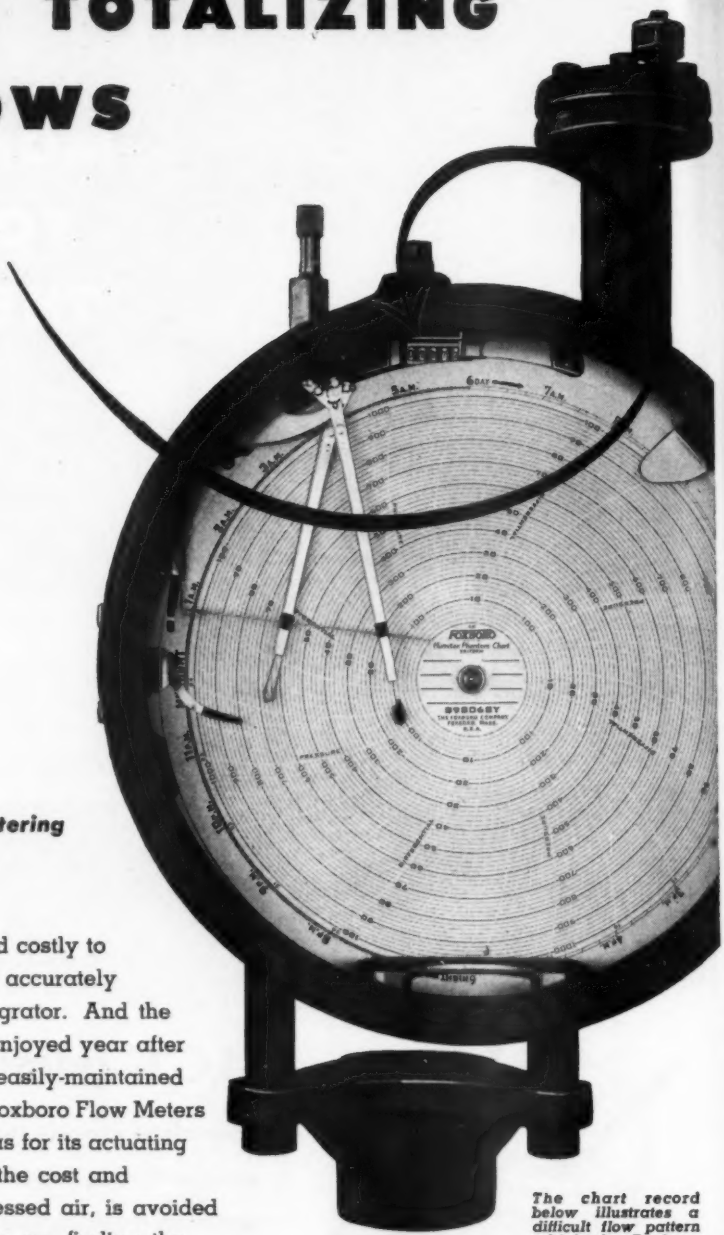
Write for Catalog 4-OG, describing types and sizes, to: American Car and Foundry Company, Valve Division, 1501 Ferry Ave., East, Detroit, Mich.

AUTOMATIC TOTALIZING of GAS FLOWS

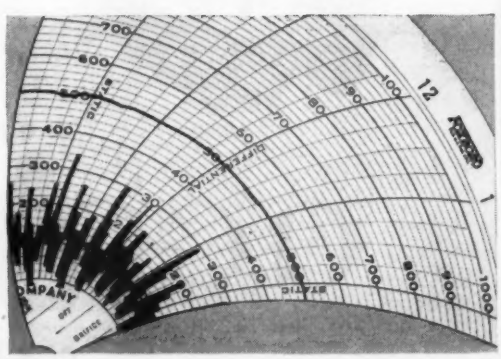
pneumatic integrator accurately follows even rapidly varying flows

the counter reads directly in cubic feet—or other desired units.

★ ***saves time and cost of planimetering***
★ ***eliminates electrical hazard***



The chart record below illustrates a difficult flow pattern which the Foxboro Pneumatic Integrator is successfully totalizing.



Even rapidly varying flows, so difficult and costly to integrate manually with a planimeter, are accurately totalized with the Foxboro Pneumatic Integrator. And the savings over "manual" totalizing will be enjoyed year after year, indefinitely. ↑ ↑ ↑ This simple and easily-maintained device, which is available on all types of Foxboro Flow Meters used in the oil fields, utilizes the flowing gas for its actuating power. Thus the hazard of electricity, or the cost and difficulty of providing a supply of compressed air, is avoided altogether. ↑ ↑ ↑ Many oil field operators are finding the Foxboro Pneumatic Integrator an ideal solution to their gas flow totalizing problems. It is fully described in Bulletin 394 . . . write for your copy. **The Foxboro Company, 60 Neponset Avenue, Foxboro, Mass., U.S.A.**

FOXBORO
REG. U. S. PAT. OFF.
Instrumentation

The THREDKOTES are a group of compounds developed especially for various types of threaded connections used in the petroleum industry and *field-tested to give your threads longer life.*

On highly-machined threads, THREDKOTE prevents galling, acts as a lubricant. On loose or worn threads, there's a THREDKOTE that seals the joints, works well under pressure and load.

Wherever you use threaded pipe, also use a Humble THREDKOTE to save the threads and seal the joints.

THREDKOTE

is sold by

HUMBLE OIL & REFINING COMPANY, Houston, Texas

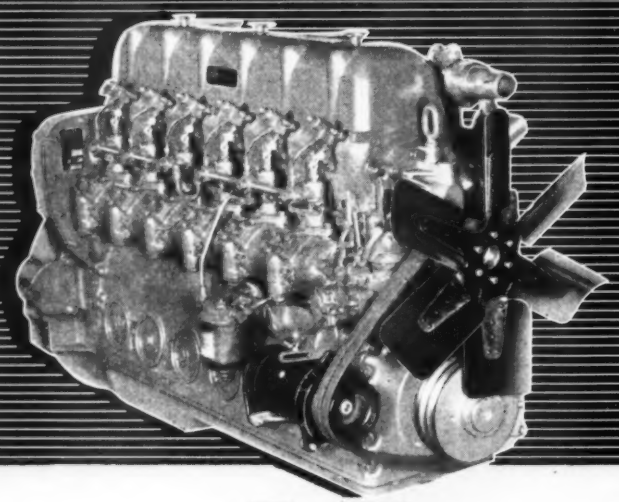
THE CARTER OIL COMPANY, Tulsa, Oklahoma

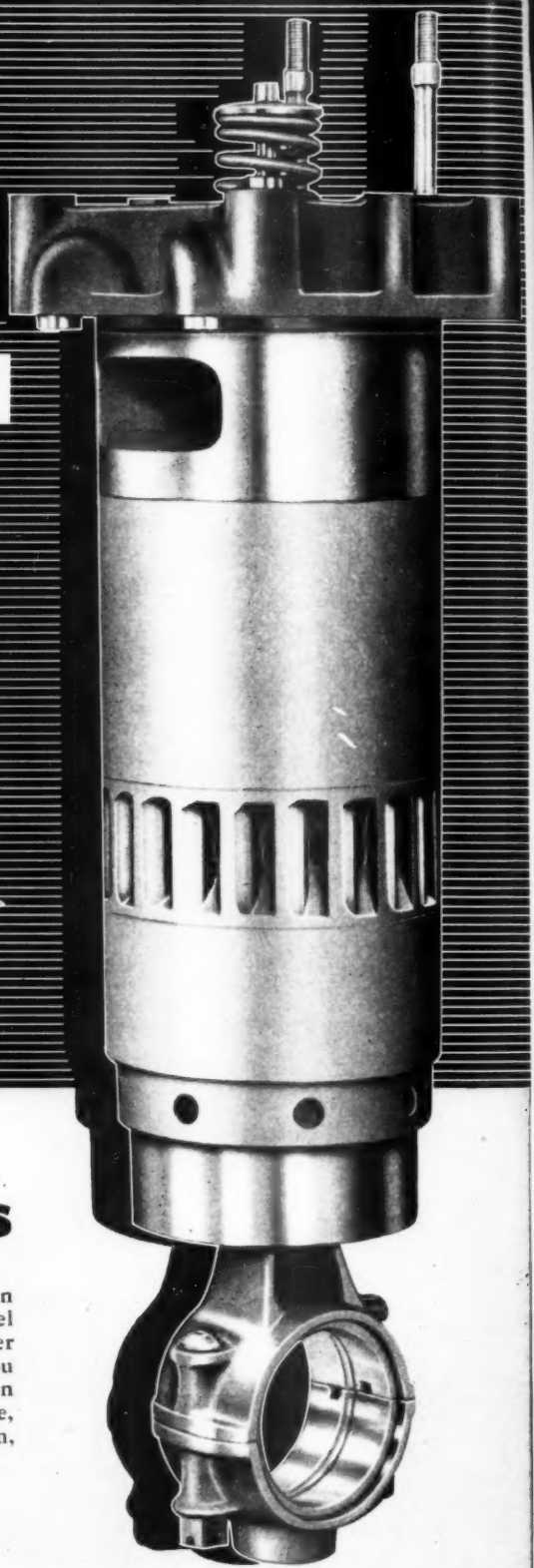
and leading oil field supply houses everywhere.

THREDKOTE 701	THREDKOTE 702	THREDKOTE 705	THREDKOTE 708
For extreme pressure connections, oil well casing and tubing, tool joints.	For Christmas Tree assemblies, steam lines.	For extreme and high pressure connections.	For air lines, bolted tanks, gas and gasoline lines, gasket seals, oil well casing and tubing, permanent sealer.

XUM

simplified design





P&H
DIESEL ENGINES
(2 Cycle)

The complete assembly of cylinder head, liner, piston and rod is interchangeable as a unit in *all* P&H Diesel engines — 1, 2, 3, 4 or 6-cylinder models. Simpler design with fewer parts saves you time — saves you trouble — saves you money. It's another good reason for standardizing on P&H Diesels. For literature, write Diesel Division, Harnischfeger Corporation, Port Washington, Wisconsin.

P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
PORT WASHINGTON WISCONSIN, U. S. A.

THEY'VE TURNED ON THE GAS IN THE

Hudson Valley

They've turned on the natural gas in the historic Hudson Valley. Housewives in Poughkeepsie, Newburgh, Kingston and other valley cities are discovering its advantages—its cleanliness, its convenience and its superiority as a household fuel.

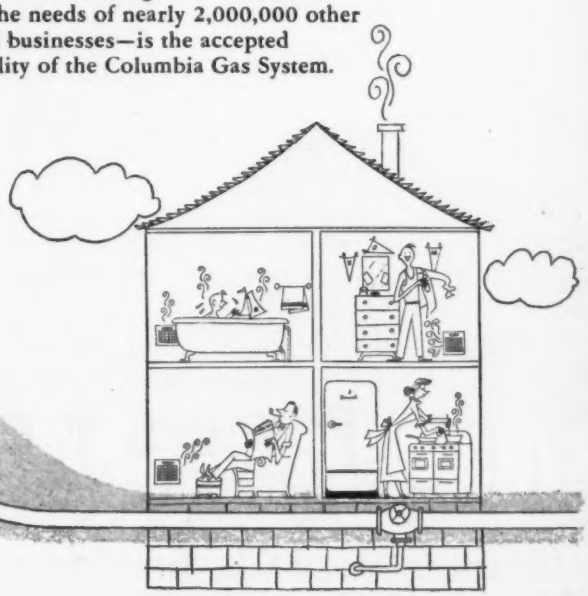
They'll soon discover its economy, too.

In a score of other communities in Maryland, Pennsylvania and Virginia—the story will be the same. For the Columbia Gas System, in order to meet local utilities' economic need for natural gas service, has spent five years and $200,000,000 to bring it to them.

As a result, in 1950 nearly 600,000 homes and businesses will get the benefit of natural gas service for the first time. Meeting their need for gas—and the needs of nearly 2,000,000 other homes and businesses—is the accepted responsibility of the Columbia Gas System.

COLUMBIA GAS SYSTEM

COLUMBIA GAS SYSTEM



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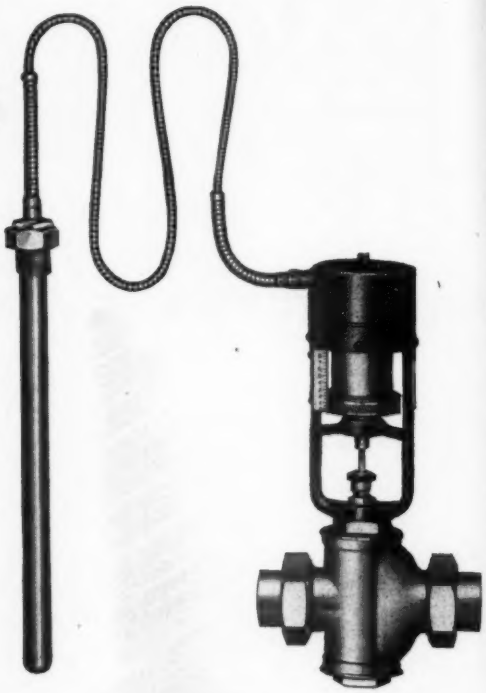


No. 530 Sylphon Engine Safety Control *(above), simple and compact. Gives positive protection against damage of overheating or low lube oil pressure.*

No. 923 Sylphon Temperature Regulator *(right). Thermostatically controls circulation of cooling water, maintains jacket temperature at constant operational level.*

They stop engine trouble from starting!

HERE ARE two "watchmen" that will always be on the job, to save you engine trouble—or shutdowns, possible costly damage and repairs.

And they do their jobs dependably, night and day—whether you're at hand or not!

No. 530 Control gives positive protection against overheating and low lube oil pressure. If cooling water temperature goes above, or lube oil pressure goes below safe limits, it sounds an alarm—or stops the engine.

No. 923 Regulator thermostatically controls cooling water circulation—keeps engine jacket temperature right.

Both controls are ideal for diesel, gas or other internal combustion engines. They're self-contained, self-powered. Easily installed. Sturdily built to give you long, troublefree service. For complete information, write for Bulletin TO-817.

FS

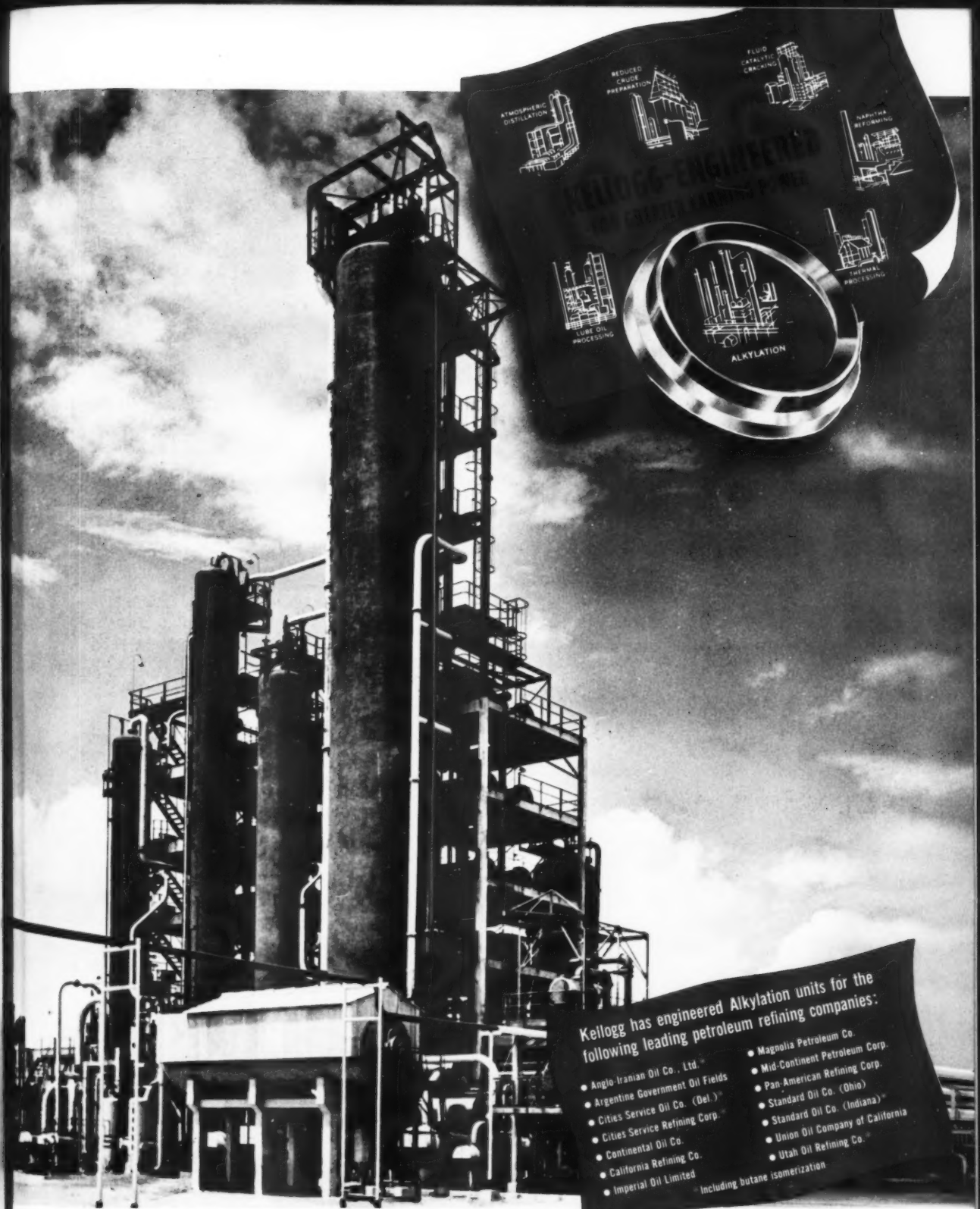
FIRST WITH BELLOWS

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal


ATMOSPHERIC DISTILLATION
REDUCED CRUDE PREPARATION
FLUID CATALYTIC CRACKING
NAPHTHA REFORMING
THERMAL PROCESSING
LUBE OIL PROCESSING
ALKYLATION
Kellogg has engineered Alkylation units for the following leading petroleum refining companies:
• Anglo-Iranian Oil Co., Ltd.*
• Argentine Government Oil Fields
• Cities Service Oil Co. (Del.)*
• Cities Service Refining Corp.*
• Continental Oil Co.
• California Refining Co.
• Imperial Oil Limited
• Magnolia Petroleum Co.
• Mid-Continent Petroleum Corp.
• Pan-American Refining Corp.
• Standard Oil Co. (Ohio)
• Standard Oil Co. (Indiana)*
• Union Oil Company of California
• Utah Oil Refining Co.*
* Including butane isomerization

More than 1½ million gallons of 90+ alkylate flow every 24 hours from Kellogg-engineered Alkylation units!

XUM

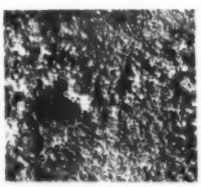
Yes! Kellogg-built Alkylation units produce 1 gallon of high-octane alkylate to every 65 gallons of gasoline produced in America!

BORN to meet the needs for wartime aviation fuels, Alkylation units are today contributing significantly to refinery operations. Not only are they being utilized for the production of aviation gasoline, but, more importantly, they are supplying high-octane blending components for premium motor fuel.

Kellogg has always recommended sulphuric acid Alkylation because of lower initial and maintenance costs and safer operation. The soundness of this recommendation is indicated by the number of companies that have continued the profitable operation under peacetime conditions of Kellogg's wartime sulphuric acid units.

Three new units (two in the U. S. and one abroad) now being built by Kellogg indicate that the Alkylation process is again being carefully evaluated by refiners as a means of meeting the ever-increasing octane levels.

ACID HANDLING AND HEAT REMOVAL ARE KEY PROBLEMS IN DESIGN



Alkylation employs corrosive acids in the catalyst reaction and is highly exothermic. To meet the requirements of the latter, Kellogg designed a special system of auto-refrigeration which reduces both initial and maintenance costs. To combat corrosion, Kellogg's metallurgical groups, who have conducted a continuous study of the problem for many years, incorporate in current designs all of the latest improvements in corrosive handling equipment and piping design.

IT TAKES ALL SEVEN TO PRODUCE GREATER EARNING POWER . . .

1 THE DEVELOPMENT "TOOLS"
—laboratories, pilot plants and recognized specialists to prove and improve processing and equipment ideas.

2 PROCESS ENGINEERING
by three distinct groups of specialists—*sequence* engineers, *unit* engineers and *development* engineers—supported by an extensive reservoir of exclusive data.

4 SPECIALIZED BUYERS
backed by the cumulative buying power of the largest company in the business.

5 COMPLETE FABRICATING FACILITIES
to make schedule deadlines and to develop workable "firsts" in refinery equipment.

6 CONSTRUCTION KNOW-HOW
acquired in completing hundreds of major jobs, plus an ample supply of the proper tools, and the constant development of new money-and-time-saving methods on the construction lot.

7 PRACTICAL OPERATING COUNSEL
on all design and construction, achieved through practical operating men working as an integral part of the company.

3. Specialists in every phase of DESIGN ENGINEERING

Beyond eight specialized design divisions, there are several groups of specialists that serve the engineering departments as a whole. Contributing greatly to lowered cost of Kellogg-designed units is the STANDARDS SECTION. These men devote their full time to establishing general technical standards that are followed by all engineering sections. In addition, they produce charts of prescribed engineering details, special templates and even, on occasion, special slide rules. Not only does this section's work save vast numbers of engineering hours but it helps assure a continuity of high quality in all Kellogg engineering.

. . . AND ONLY KELLOGG HAS ALL SEVEN!

The M. W. Kellogg Company, (a subsidiary of Pullman Incorporated), New York, Jersey City, Los Angeles, Tulsa, Houston, Toronto, London, Paris

Why the FIRST names in pipelines depend on the FIRST* name in line pipe

*FIRSTS by A. O. SMITH • Welded line pipe • Internal expanded pipe • Light wall large diameter pipe • World's largest producer of large diameter welded steel line pipe

"Straight as a die" can be taken literally when oil men discuss A. O. Smith Line Pipe. That's because A.O. Smith's internal expanding process stresses the pipe beyond its yield point—and when pipe is stressed beyond its yield point by uniform internal expansion it automatically comes out round, straight, and consistently of the right diameter.

Uniformly round, straight pipe eliminates time-consuming "line-up" operations in the field and makes possible consistent "stringer bead" welds.

In addition, the A. O. Smith expanding process produces pipe of high yield strength permitting higher operating pressures without the use of alloy steels and their accompanying special welding practices. No wonder the *first* names in pipelines depend on the *first* name in line pipe!

A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝ in. to 36 in. in diameter.

A.O. SMITH CORP. 76th ANNIVERSARY 1874 1950

A.O.Smith

LINE PIPE • CASING

Atlanta 3 • Chicago 4 • Dallas 2 • Denver 2 • Houston 2
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DEPENDABILITY *through* RESEARCH *and* ENGINEERING

3 EFFICIENCY EXPERTS IN THE OIL FIELDS

Pipe wiper, rotary hose and V-Belts make drilling hours more productive

NEW PIPE WIPER is reversible, molded in one piece with double wiping lips. Does the work of two old-style wipers, yet costs no more than the single type. Easily cut to pipe size. THE "U.S." PIPE WIPER lasts much longer than ordinary wipers.

NO LOAFING HERE. Each individual U. S. RUBBER V-BELT does its full share of the work, providing equal tension and long, trouble-free operation. Holds up under the hard, all-weather service required in the oil field.

"U. S." ROTARY HOSE is just what today's larger rigs need for smooth flow and *more* drilling hours. From the built-in coupling, throughout the strong flexible body—this hose is built to avoid expensive shut-downs.

Cut costs, eliminate delays, avoid wasted production time by specifying U. S. Rubber products for the oil field. Remember that each has been designed by oil field specialists. Write to:

PRODUCTS OF

U.S.RUBBER

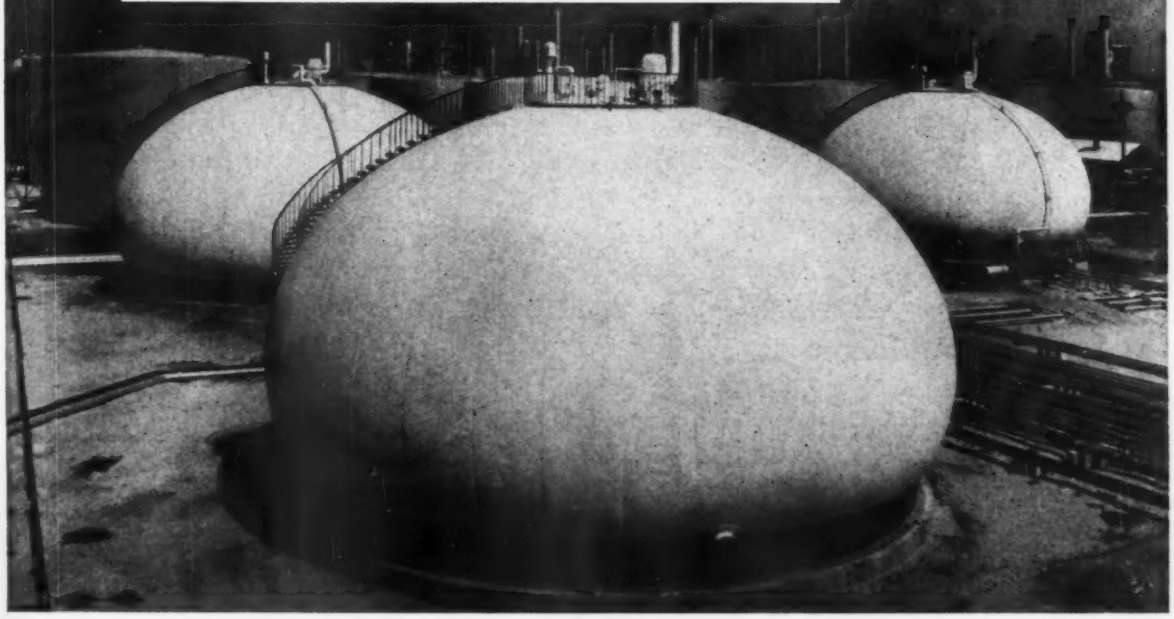
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

For Efficient and Economical Protection — Use . . .

PITTSBURGH TANKHIDE!



PAINT protection that really lasts—that's what you get when you use Pittsburgh TANKHIDE for your major tank and structural steel painting requirements.

● **TANKHIDE** primers and finishing coats have been used most satisfactorily for many years in all sections of the country to protect millions of tons of iron and steel structures, equipment and machinery.

● **The combination** of intensely white Titanium pigments in weather-resistant synthetic vehicles has made Synthetic White Tankhide a durable, long-lasting metal protective paint.

● **Its high heat** and light reflection characteristics prevent the excessive heat absorption that brings about evaporation waste. Not only is this low evaporation loss maintained but its brilliant white appearance lasts because of TANKHIDE'S unique self-cleaning action.

● **With proper spray** manipulation, Synthetic White TANKHIDE will hide thoroughly with one coat. Satisfactory hiding can also be obtained by careful brush application where spraying is not possible.

● **Pittsburgh offers** a complete line of protective coatings for every need in the petroleum industry—production and refinery finishes for towers, pipe lines, buildings and equipment; METALEAF Aluminum Paints; service and bulk station paints; pump enamels and drum finishes.

● **Call on us** for expert advisory service. Our wide experience in supplying finishes to the petroleum industry can be helpful and even save you time and money!

• • •

PITTSBURGH PLATE GLASS COMPANY

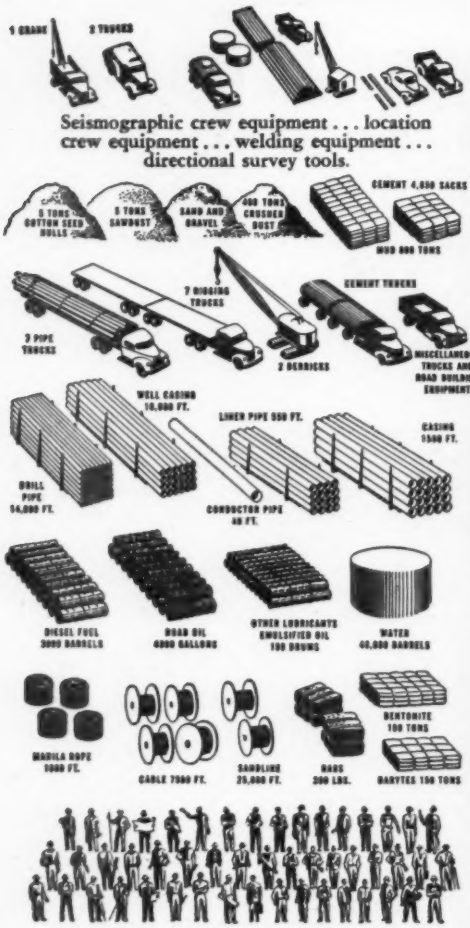
Industrial Paint Division, Pittsburgh, Pa.

Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio. M. B. Suydam Division, Pittsburgh, Pa.

PG **PITTSBURGH** *Industrial* **FINISHES**

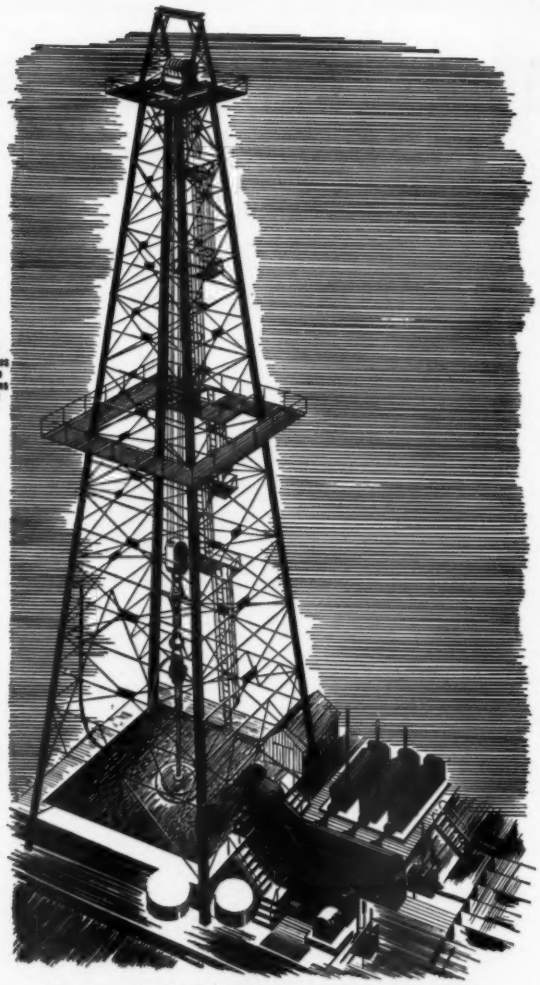
PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY



Seismographic crew equipment . . . location crew equipment . . . welding equipment . . . directional survey tools.

One hundred and thirty two men who are experts in many fields—law, geology, engineering, drilling, trucking, carpentry, derrick building, chemistry, mechanics and so forth.



One completed oil derrick with all its diesel engines, bits, fishing tools, reamers and other equipment.

Want to drill an oil well? Here's all you need

There *may* be oil under your backyard . . . but you might as well face the fact that it will take a bit of doing to find out.

The picture above shows all the men and materials needed to drill one 10,000-foot exploratory well here in the United States. Total cost will be anywhere from $125,000 to $1,000,000 depending on conditions encountered.

Will oil be found? Even with the best scientific help only about one out of every five exploratory wells drilled "come in."

The search for oil is a risky, expensive business, but it goes on every day in many parts of the world. In 1949 alone, we drilled 28 exploratory wells at a cost of $6,385,000 . . . six striking oil.

A great share of the profits of Standard of California goes back into the business in exploration of this kind . . . and in building new refineries, new pipelines, new storage plants and other facilities. From these come good petroleum products to serve you well . . . petroleum products to add still more strength to our nation in the uncertain days ahead.

STANDARD OIL COMPANY OF CALIFORNIA

plans ahead to serve you better

Need special high pressure gaskets such as these?
Flare-type Gasket with Bellows Action
Delta Joint Gasket
Pressure Seal Joint Gasket

We tailor them to your specifications

If you require high pressure gaskets made to extremely close tolerances—for service exceeding 10,000 psi, for example—and fabricated to any desired diameter or cross-section, why not look into the special service that Goetze offers for making these gaskets to your order.

The gaskets shown above are typical of the wide variety for high pressure service that have been made to order for Goetze customers. The flare type gasket with bellows action illustrated at upper right is but one example of what Goetze "know-how" can accomplish.

Goetze has had over sixty years of experience in making specialized metallic gaskets for industry's most complex jobs. Modern machines—many of them specially designed and built by Goetze—enable Goetze craftsmen to produce gaskets of any required design, shape or size... and deliver them with remarkable promptness.

For further information about Johns-Manville Goetze gaskets, write for a copy of the new Goetze Gasket Catalog. Or send us a drawing or template for assistance on your specific problem. Address Johns-Manville, Box 290, New York 16, N. Y.

Johns-Manville Goetze GASKETS

THERE'S A JOHNS-MANVILLE PACKING AND GASKET FOR EVERY SERVICE.

Bingham

PRECISION BUILT FIELD PROVEN PUMPS

Koke-Krusher

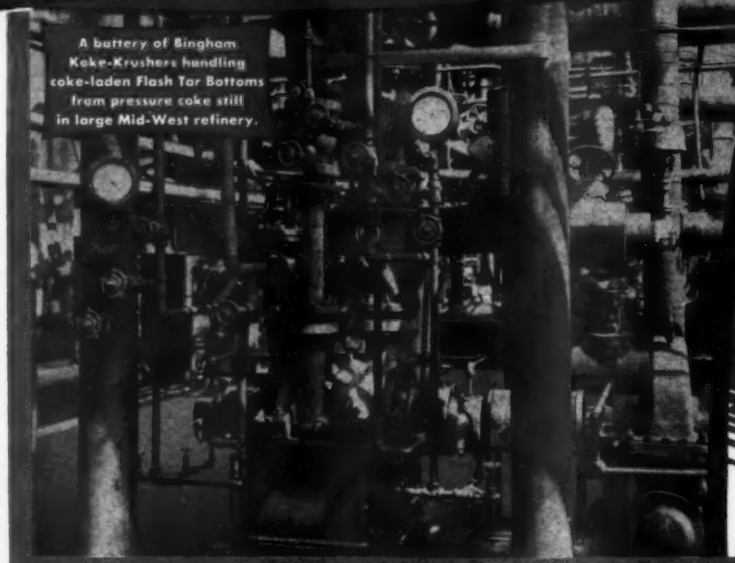
...the only pump that crushes entrained coke

This centrifugal pump does what heretofore has been considered impossible — it instantly pulverizes large pieces of coke in the pumpage by crushing. A durable, positive crushing mechanism located in the suction chamber in front of the impeller eye instantly crushes large pieces of hard coke entrained with the pumpage and pulverizes them before they can enter and clog the impeller and system equipment.

CRUSHES INSTANTLY

• • •

Bingham Koke-Krushers, like all Bingham products, are precision built in our new and modern plant. All rotating parts are dynamically balanced. Each part is subjected to rigid inspection by expert craftsmen.



A battery of Bingham Koke-Krushers handling coke-laden Flash Tar Bottoms from pressure coke still in large Mid-West refinery.

Section of Inspection Department in our new modern plant.

SEND NOW for Koke-Krusher Folder 106

Tells why it is sound economy to use the Koke-Krusher on new installations or for the replacement of worn-out, old style reciprocating pumps. Wire, write, or phone the Bingham Pump Sales Office nearest you.

Bingham — DOUBLE VOLUTE RADIAL BALANCE — PUMPS SINCE 1921

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Portland, Oregon

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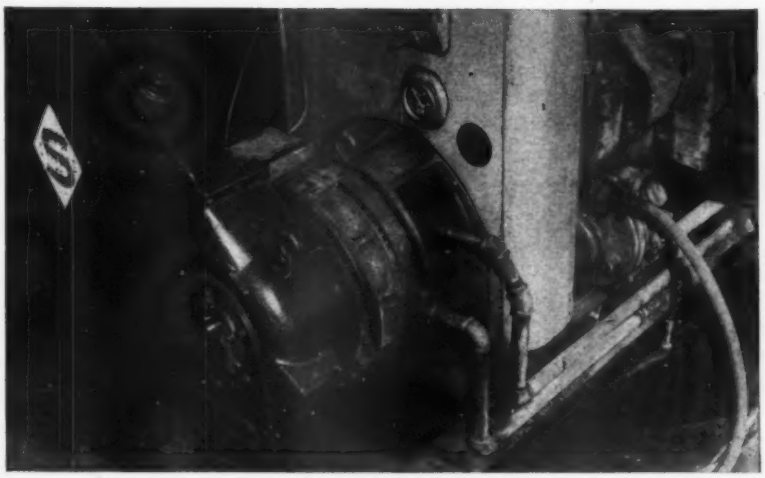
Twin Disc Helps Set a Record:

47 Wells...No Drawworks Down-time

47 wells—a total of 148,470 feet—with no down-time logged on the drawworks. That's the record posted by this Unit Rig U-34 drilling rig, with the engine driving through a Twin Disc Series 10,000 Hydraulic Torque Converter, since starting its first well November 16, 1947.



This Twin Disc Torque Converter-equipped Unit Rig Model U-34, first in the field, is setting records for making hole—and for trouble-free operation—for Service Drilling Company of Tulsa. The mast is raised with the engine, at idle, delivering its power through the torque converter—one example of how this unit makes best use of power from the GM 6-71 Diesel.

And the record for making footage is just as good. This rig took only nine days overall drilling time, including 36 hours cementing time, to go 3227 feet on its latest well near Borger, Texas, under tougher than normal conditions.

Not a single chain was replaced before 120,000 feet, and then only because of slight signs of wear. Brake blocks were also replaced at 120,000 feet. But these have been the only replacements in over 28 miles of drilling!

E. A. Smith, president of the Service Drilling Company and owner of the rig, says: "The performance of this drawworks has been beyond what anyone could expect."

If you want to cut your down-time, if you want to make hole faster, then select equipment, such as Unit Rig's U-34, with Twin Disc Hydraulic Torque Converters.

For these units cushion out all shocks and dampen engine vibrations—pick up the load smoothly and eliminate jerks—and multiply engine torque up to five times. For complete information about Twin Disc Hydraulic Torque Converters (Lysholm-Smith type) write today for Bulletin No. 135-C.

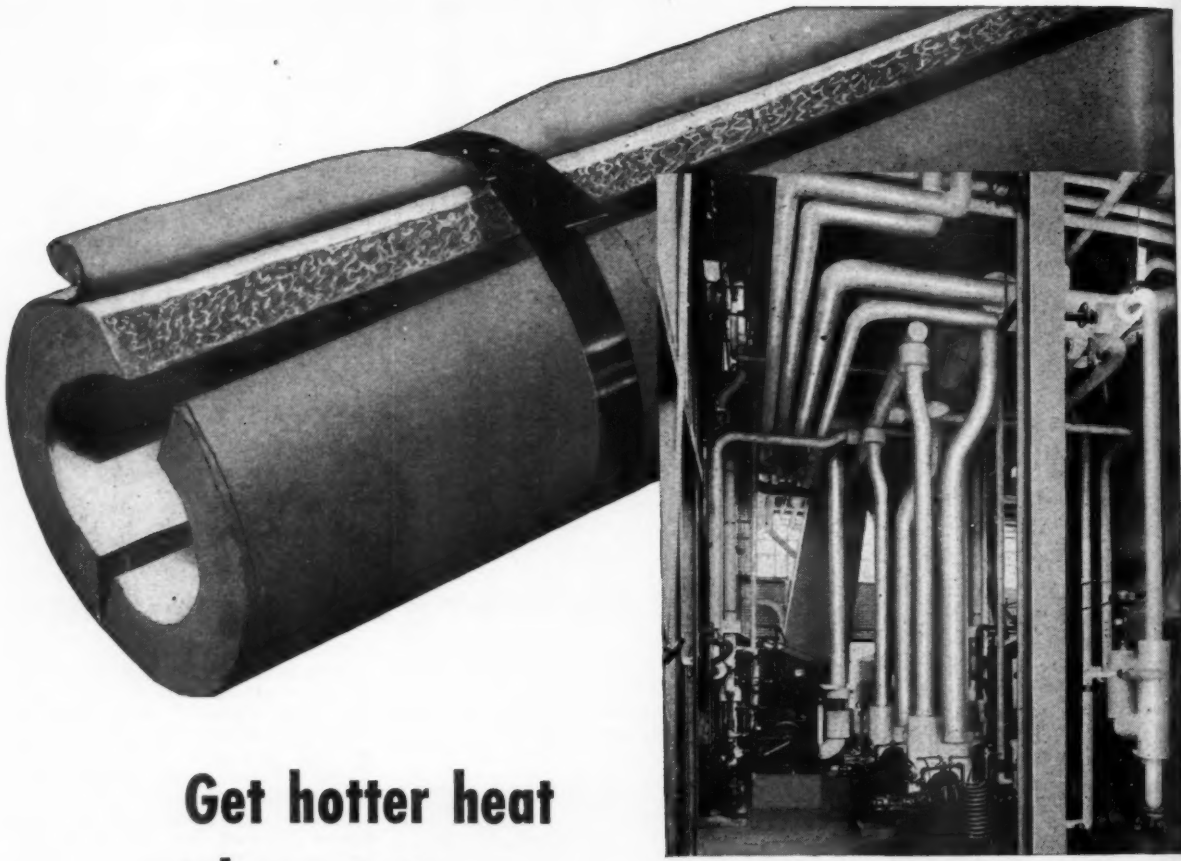
TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

Clutches & Hydraulic Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

XUM



Steam piping, covered with K&M "Featherweight" 85% Magnesia, in Standard and 1½" thicknesses; canvas covered.

Get hotter heat at less cost with K&M "FEATHERWEIGHT"® insulation

Keep heating costs down—and heating efficiency up—with K&M "Featherweight" 85% Magnesia Insulation. 85% Magnesia is the most widely accepted insulating material in its field. And in K&M "Featherweight," basic carbonate of magnesia is combined with selected and specially processed asbestos fibers to produce a highly efficient insulation of extremely low thermal conductivity.

K&M "Featherweight" withstands temperatures up to 600° F. without loss of insulating value. And, though it's amazingly light in weight, it is strong and durable also. It can withstand vibration, a reasonable amount of compression, and its insulating properties are not affected by alternate wetting and drying. As it is entirely mineral by nature, it cannot burn.

"Featherweight" 85% Magnesia insulation is easy—and economical—to apply. It can be stored and handled without any special precautions. No special tools are needed to apply it: "Featherweight" is easily sawed and cut; can be fitted snugly to contours without breaking apart.

K&M "Featherweight" 85% Magnesia is furnished for all standard pipe sizes in sections and in sets of segments 3 feet long in the following thicknesses; Standard, 1½", 2", double standard (broken joint) and 3" (broken joint). Blocks and lagging are also available for irregular surfaces. Ask your K&M Distributor for complete information, or write us direct.

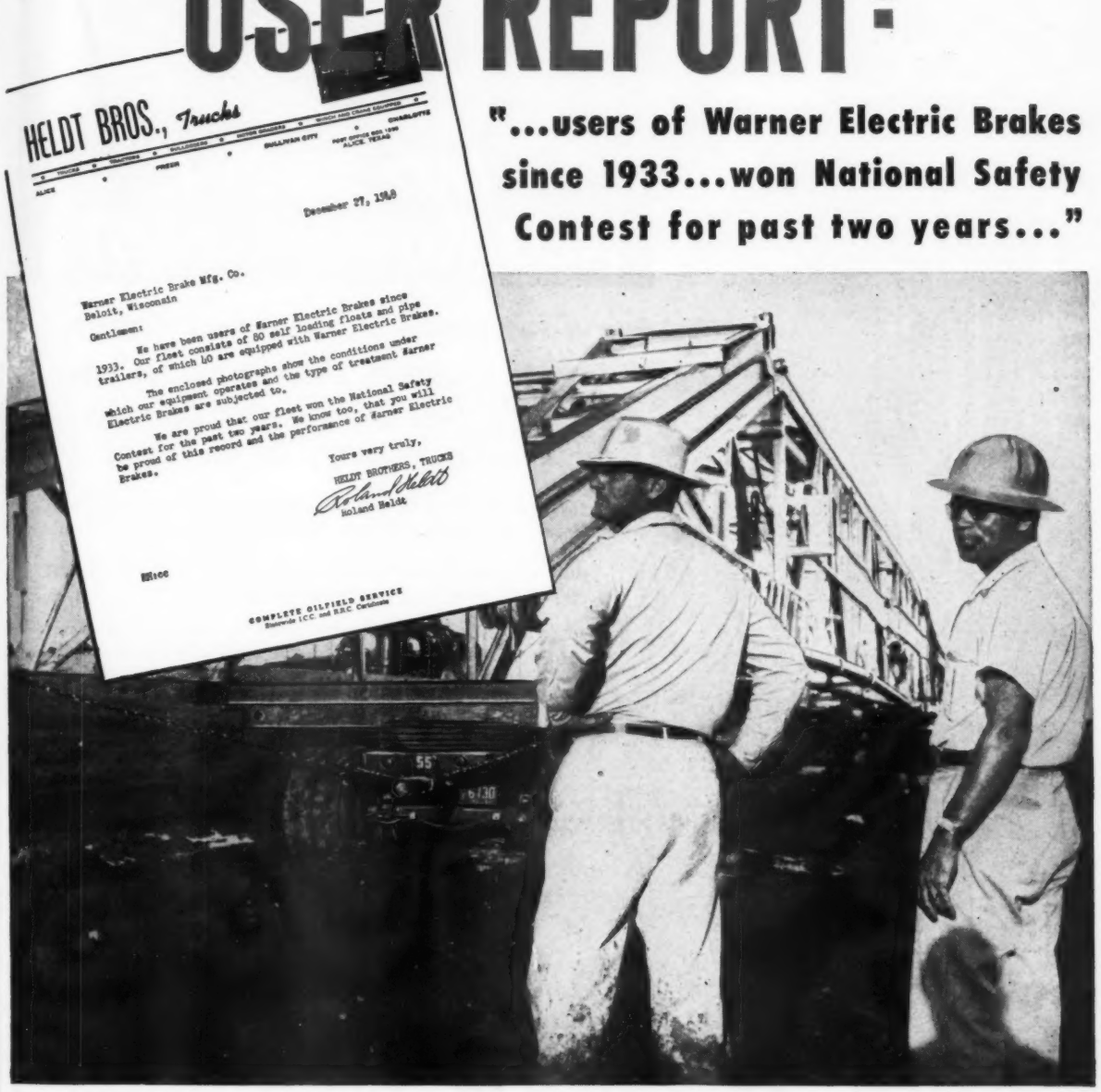
K&M best in asbestos ®

Nature made Asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

USER REPORT:

"...users of Warner Electric Brakes since 1933...won National Safety Contest for past two years..."


HELDT BROS., Trucks
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ALICE, TEXAS
CHARLOTTE
December 27, 1949
Warner Electric Brake Mfg. Co.
Beloit, Wisconsin
Gentlemen:
We have been users of Warner Electric Brakes since 1933. Our fleet consists of 80 self loading floats and pipe trailers, of which 40 are equipped with Warner Electric Brakes.
The enclosed photographs show the conditions under which our equipment operates and the type of treatment Warner Electric Brakes are subjected to.
We are proud that our fleet won the National Safety Contest for the past two years. We know too, that you will be proud of this record and the performance of Warner Electric Brakes.
Yours very truly,
HELDT BROTHERS, TRUCKS
Roland Heldt
Holand Heldt
Miss
COMPLETE OILFIELD SERVICE
Statewide ICC and RRC Certificate
55
6730

LOOK at that muck and mire! That's the stuff that's sheer murder on men and machines — the stuff you've got to expect when you go after oil — because oil is where you find it. Just ask the Heldt Bros., who specialize in going where oil is — and roads just ain't. That means, too, that trailer brakes must withstand every kind of severe weather and road condition. So take a tip from Heldt Bros. — get Warner Electric Brakes.

Warner Electric Brakes give lightning-fast action with an infinite degree of braking control, plus low-cost installation and maintenance. There's full clearance under the tractor and trailer — nothing to get knocked off or leak — no exposed braking equipment — no rods to rattle — no tubing to split — only simple wiring to each wheel.

For full information see your nearest Warner Electric Brake dealer — or write:

WARNER ELECTRIC BRAKE & CLUTCH COMPANY
BELOIT, WISCONSIN

Revolutionary!
Warner Electric Brakes of 2-shoe construction in sizes 16½" x 5", 16½" x 6", and 16½" x 7". A really new concept of super-stopping power. Ask about them.

WARNER
THE ORIGINAL AND PROVEN
ELECTRIC BRAKES

SINCE 1927

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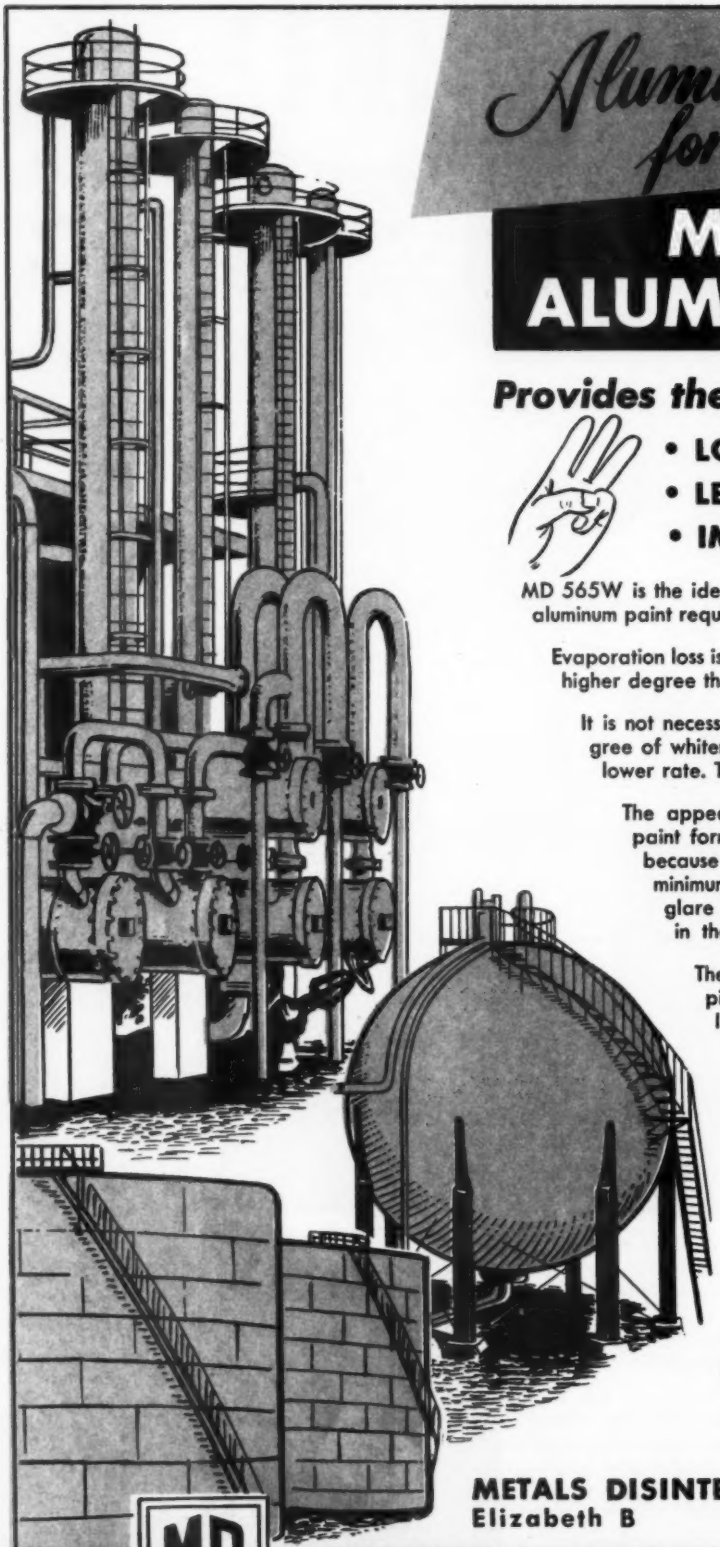


Aluminum Paint formulated with–

MD 565W ALUMINUM PASTE

Provides these 3 big advantages–

- **LOWER EVAPORATION LOSS**
- **LESS FREQUENT PAINTING**
- **IMPROVED APPEARANCE**

MD 565W is the ideal all-purpose pigment for the formulation of aluminum paint required for petroleum equipment.

Evaporation loss is greatly reduced, because it reflects heat to a higher degree than standard paste pigments.

It is not necessary to paint so often. Due to the greater degree of whiteness in MD 565W, color change is at a much lower rate. This results in reduced maintenance costs.

The appearance of equipment painted with aluminum paint formulated with MD 565W is greatly improved, because it produces a whiter, brighter finish with a minimum of highlighting and spotty glare. Its non-glare characteristics are particularly advantageous in the painting of large surfaces, such as tanks.

These and many other features make this new pigment a fast increasing favorite for petroleum industry use.

To assure these advantages in your aluminum painting, specify that MD 565W be used in the formulation of the ready-mixed aluminum paint you purchase, or in those paints which you formulate.

Send For–

your copy of bulletin "Reflectivity of Aluminum Flake Pigments"

METALS DISINTEGRATING COMPANY, INC.
Elizabeth B • New Jersey

MD POWDERS Since 1916

ALUMINUM PASTES
ALUMINUM POWDERS
GOLD BRONZE POWDERS

Solve your Hose Problems with

REPUBLIC RUBBER
DIVISION
LEE RUBBER & TIRE CORPORATION

Mud Pump Hose

Rotary Hose

Unloading Hose

Steam Hose

In REPUBLIC oil country hose you get two important "PLUS" factors:

FIRST — The usual raw materials and manufacturing facilities PLUS Republic experience. In the case of Republic, experience has profited profoundly by continuous, intensive research. Republic oil country hose is like no other hose made, except for superficial appearance. You can expect better service — and you get it.

SECOND — If you decide to standardize on better hose, it doesn't take an Act of Congress to get Republic. We offer it through 105 sales points: 80 stores, 17 sales offices, 8 resident salesmen. We cordially invite you to ally yourself with this remarkable distribution system.

Member Petroleum Equipment Suppliers Association

80 Stores
17 Sales Offices
8 Resident Salesmen

"... here's *MY* warehouse!"

Jones & Laughlin Supply Company

Subsidiary of Jones & Laughlin Steel Corporation

J&L STEEL

TULSA, OKLAHOMA

XUM

low-cost process heat

dependable low-speed power

GET BOTH with G-E

If your plant uses process steam, you may be able to improve over-all heat balance by driving low-speed equipment with General Electric geared turbines. Mechanical drive turbines act as reducing valves to drop boiler steam pressures down to utilization temperatures for process requirements. With turbines skimming off only a small portion of the steam's heat, mechanical power for driving fans, blowers, pumps and other low-speed apparatus is almost free.

Standard Type DP and DR turbines, combined with General Electric precision-type gears, are ideal for many such applications.

PRECISION GEARING

General Electric balanced-thrust gears are specifically designed for use with turbine drives. Smoothness and quietness of operation are the result of maintaining tooth contours and spacing to a high degree of accuracy.

Positive lubrication assures long life. Oil is delivered to the bearings from a gear-type pump driven by the pinion shaft. The gear mesh is spray-lubricated.

To meet a variety of application requirements, these gears are available in ratios from 1.5 to 10.3.

PRECISION GOVERNING

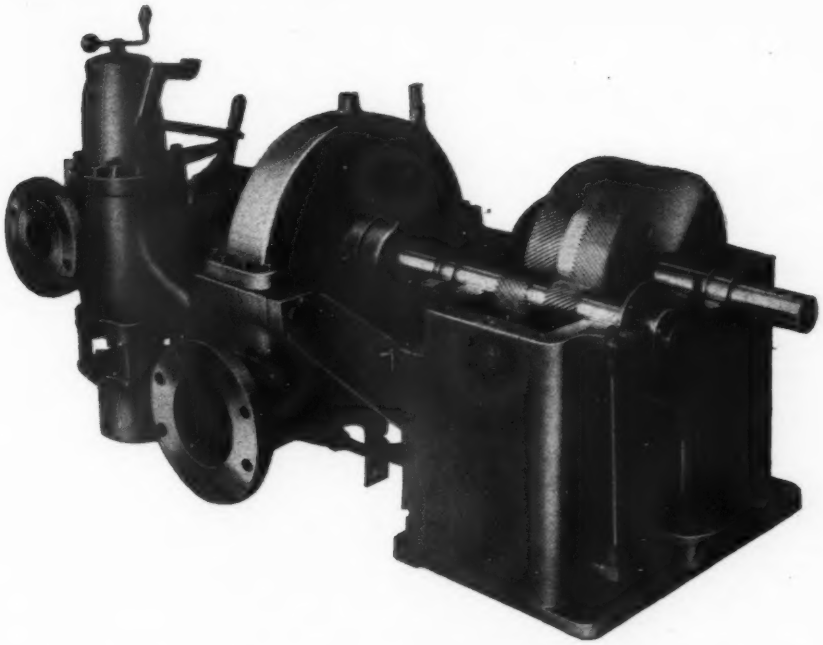
General Electric Type DP and DR turbines include extra features at no extra cost. The DP's hydraulic governing system provides a speed range of 30 per cent with 6 per cent regulation. The DR's oil-relayed governor offers speed ranges up to 5 to 1 with accuracy of ¼ of 1 per cent. Each turbine has its easily operated trip-throttle valve and governing valve combined in one compact unit. Rugged construction from quality materials makes these standard turbines outstanding for reliability and efficiency.

ONE INTEGRAL UNIT

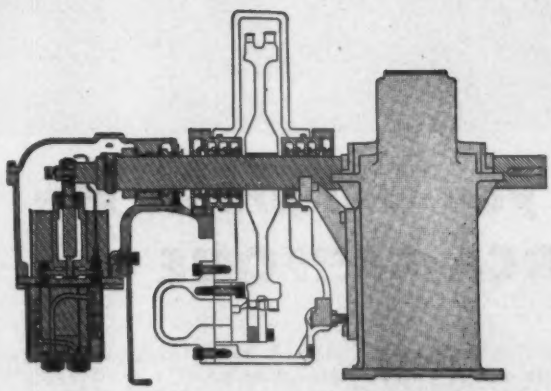
General Electric close-coupled turbine-gear sets have one common turbine and pinion shaft, with the turbine and gear casings solidly connected by a sturdy fabricated bracket. This construction results in a compact unit, does not require high-speed coupling.

Many standard parts are interchangeable with other turbine and turbine-gear drives.

Your nearby General Electric sales office will supply you with full details about mechanical-drive turbine-gear sets. Or, if you prefer, write for free copies of illustrated bulletins on these drives. The DP and DR turbines are described in bulletins GEA-4955 and GEA-5193. Bulletin GEA-5152 contains information about gears. Learn how installing these precision drives in your plant can save you money. Apparatus Department, General Electric Company, Schenectady 5, N. Y.



TURBINE-GEAR DRIVES



HERE'S WHAT STANDARDIZATION PROVIDES FOR YOU

This diagram shows how a standard DP turbine is close-coupled to a low-speed gear using an integral turbine and pinion shaft. All shaded turbine parts are interchangeable on all sizes of DP turbines. Thus, it is easy to stock spares, and maintenance costs are reduced. All individual turbine models and gear sets have standard shaft heights for easy installation or re-location in your plant. In addition, standardization cuts manufacturing expense, and the savings are passed on to you in the form of extra features usually found only on "special" turbine-gear drives.

GENERAL ELECTRIC

252-47

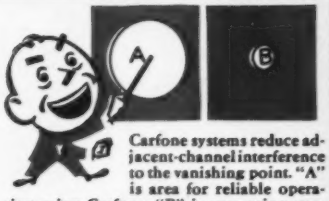
XUM

The RCA Carfone 152-174 Mc.

More than meets all FCC requirements

Complete with loudspeaker, controls, microphone, antenna, and self-contained transmitter, receiver, and power supply.

Better service over wider area



Carfone systems reduce adjacent-channel interference to the vanishing point. "A" is area for reliable operation using Carfone. "B" is area using conventional type equipment.

Holds voice level constant

Transducer modulation control holds modulated output *constant*, whether you shout or whisper into "mike." Does not "crowd" other channels. More than meets FCC rules.

Makes mounting easy

"Sandwich Case" construction makes installation easy—even in the "tight" spots. No mounting brackets needed to raise a CARFONE for servicing.

Suppresses "unwanted" radiation

Spurious emission way down on *all* frequencies—not just in the band. More than meets FCC rules for reducing interference with other services.

Bars interference

Low spurious response in CARFONE receiver does away with interference from transmitters on other frequencies.

Why you will prefer the RCA CARFONE

BECAUSE the RCA CARFONE enables systems cars and trucks to operate *without interference* over greater geographical area than was heretofore believed possible.

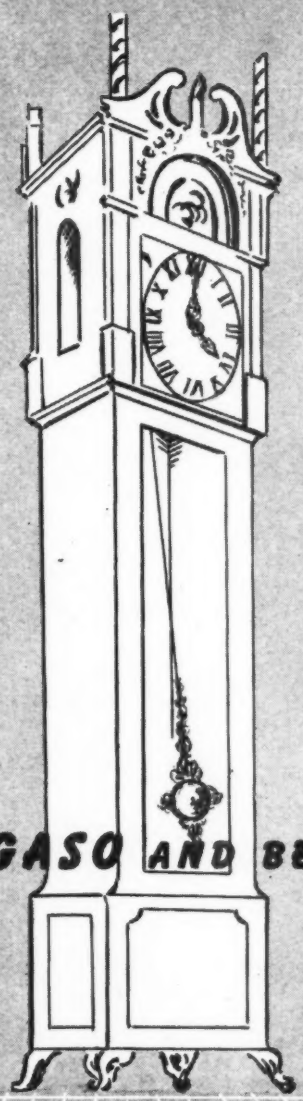
BECAUSE the RCA CARFONE can be installed almost anywhere. In passenger vehicles it can be installed on the fire wall . . . or on the shelf behind the back seat . . . or in the rear deck. In trucks it can be mounted on the wall of the driver's compartment, in the freight section, in truck side lockers.

BECAUSE the RCA CARFONE requires no extra space for opening sliding drawers—requires no double mountings—uses no junction boxes.

For complete details . . . or for consulting help on your radio system . . . write Dept. 122J. No obligation, of course.

MOBILE COMMUNICATIONS SECTION
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal



Old Age commands respect

Hundreds of "over-age" Gaso Pumps in the field tell a daily story of stamina—a story of pumps so dependable, so strong in every part, that they continue to function perfectly for almost unbelievable periods of time.

SAY GASO AND BE SURE!

GASO PUMPS

for every oil industry need

GASO PUMP & BURNER MFG. CO. 902 EAST FIRST ST., TULSA, OKLA.
EXPORT OFFICE: 149 BROADWAY, NEW YORK

Davenport: W. L. SOMNER CO., 419 Lake Street • Los Angeles: 2529 Chambers St., Vernon • Western Canada: Lufkin Machine Co., Ltd., Edmonton, Alberta

XUM

I like to fish but not in oil wells!

use NATIONAL SEAMLESS for less down-the-hole trouble

THE consistently fine records achieved with NATIONAL Seamless Oil Country Goods on successful deep producers indicate almost complete freedom from fishing jobs due to pipe failure! Fewer fishing jobs mean more economical operation and smoother going all the way.

The uniform strength and toughness of every part of every section is mainly responsible for the long and dependable service you get from NATIONAL Seamless Drill Pipe, Casing, and Tubing. For in our method of manufacture, each length of NATIONAL Seamless is pierced from a billet of high quality steel. This piercing operation—one of the most drastic operations in the forging industry—demands the very best steel. The finished product is absolutely free from any longitudinal weld which means uniform wall strength throughout.

For more information on NATIONAL Seamless Drill Pipe, Casing, and Tubing, write National Tube Company, Frick Building, Pittsburgh, Pennsylvania. Ask for Bulletin No. 15.

• • •

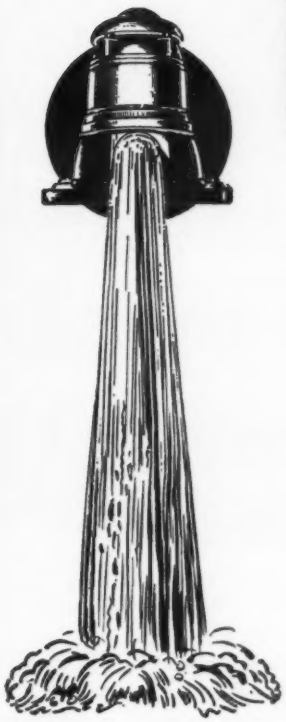
NATIONAL TUBE COMPANY, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY NEW YORK

USS

NATIONAL SEAMLESS
drill pipe . . . casing . . . tubing

UNITED STATES STEEL

A new catalog on Layne Short Coupled Service Pumps with many diagrams showing applications, is now ready and will be sent upon request.



It Isn't A Question Of LEADERSHIP

Leadership in any field is a wonderful tribute to a fine product. But the Layne organization is anxious to have all prospective buyers consider the genuine quality of their Well Water Systems. Layne wants people to remember that their years and years of world-wide experience is being used to build better and better water systems; to find and remove even the smallest imperfection; to create, test and use new ideas that step up efficiency without adding cost.

Wherever you go, you will see Layne Well Water Systems serving cities, factories and all kinds of important industrial and chemical plants. In every case the buyer has carefully measured quality and efficiency against the investment and then decided that Layne and Layne alone could fulfill his needs.

A poor well is a bad investment. A good one saves many dollars each year. You can call in Layne and then contract for the complete job; survey, test drilling, drilling of the well, setting casing and sand screen, building and installing the pumps and final testing—all by well trained men of the Layne organization. No divided responsibility.

For further information, catalogs, etc., address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

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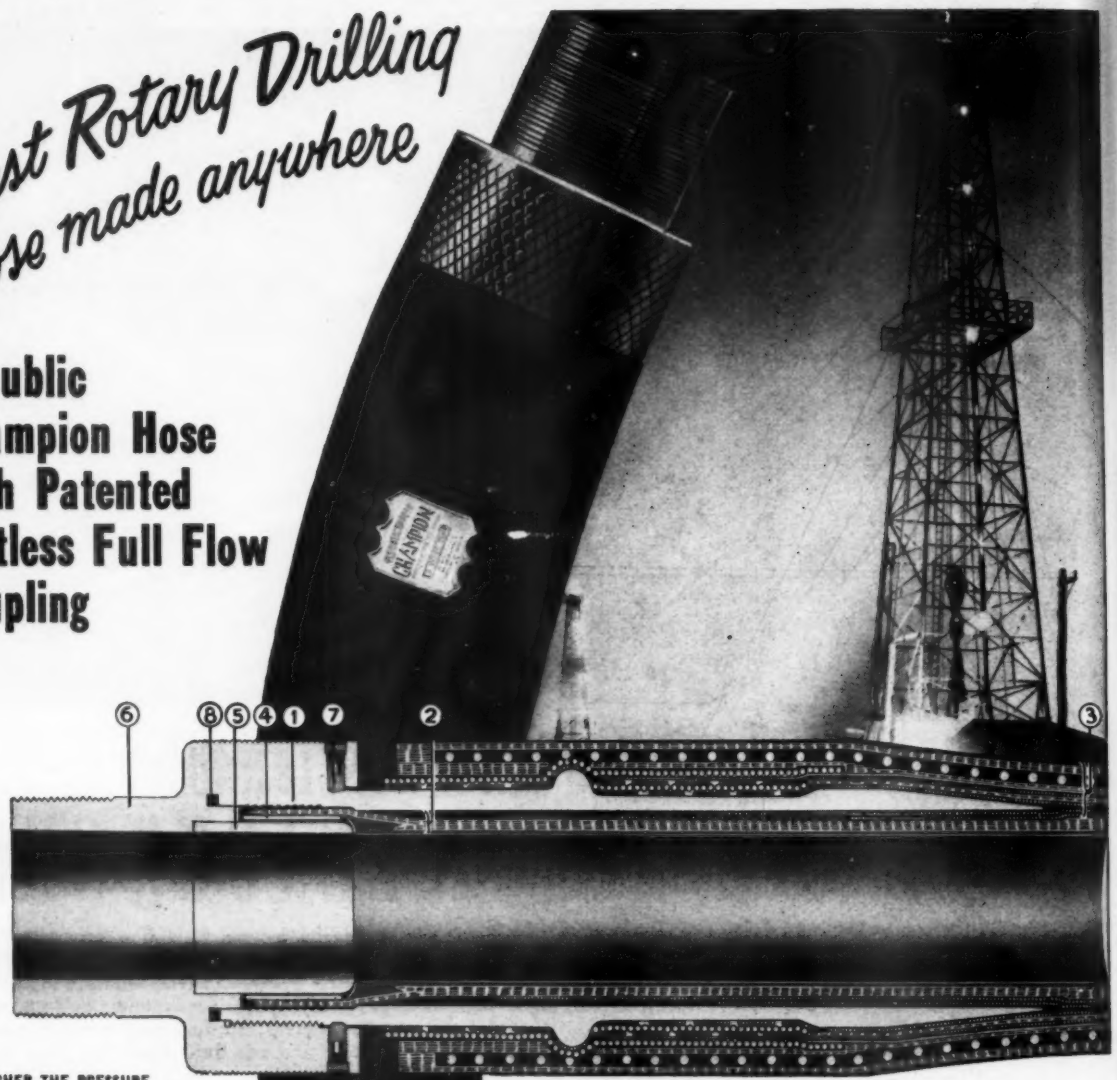
WELL WATER SYSTEMS
VERTICAL *Turbine* PUMPS

Best Rotary Drilling Hose made anywhere

Republic Champion Hose with Patented Boltless Full Flow Coupling



THE HIGHER THE PRESSURE . . . THE TIGHTER THE SEAL

In Champion Rotary Drilling Hose the nipple (1) is built in between the metal reinforcements of the hose carcass (2) and (3). The inner reinforced rubber structure (2) is anchored within the nipple and locked into leak-proof engagement by a brass expansion ring (4). This ring receives plenty of protection from the abrasive action of flowing grit by a special steel guard ring (5). As pressure pushes the reinforcing rubber structure (3) against the nipple assembly, a leak-proof union is established, and, ***as the pressure continues to increase, the tighter the seal becomes!*** Note that the cover cap (6) screws into position over the nipple assembly. It fits flush with the external diameter of the hose, leaving no projections to catch on the rigging or interfere with connections. The cap is held in position by submerged set screws and anchor cap seals (7). A rubber gasket (8) seals the joint between cap (6) and end of nipple (1).

U S PATENT No 2,234,350

● Republic's Champion Rotary Drilling Hose is a strong, flexible hose that's built to withstand severe shock and higher pulsating pressures.

Built-in steel muscles resist pressure, protect the hose against distortion. Oil-resistant Reprene throughout makes the hose practically immune to abrasion or deterioration from oil contact.

Champion Rotary Drilling Hose is available in standard lengths up to 60 feet. Type C Hose designed for 5000 psi test pressure, Type B for 4000 psi and Type A for 3000 psi. See your Republic Distributor or write direct for further information.

INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

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The Bovaird Supply Co. Tulsa, Okla.

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WEST COAST DISTRIBUTORS

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Pacific Coast Rubber Co. 51 Main St. San Francisco, Calif.

BRITISH OIL FIELD EQUIPMENT CO., LTD.

DUKE'S COURT, 32, DUKE STREET, ST. JAMES'S, LONDON, S.W.1

Telephone: Whitehall 6177 *Cables:* BOFEC London

Head Office and Works: HUNSLET, LEEDS 10

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BOFEC CAMERON

BRITISH MANUFACTURED SPECIALIZED OILFIELD EQUIPMENT

A Manufacturing License to produce in England and market the world famous products of the Cameron Iron Works, Inc., of Houston, Texas, U.S.A., has been secured by —

BRITISH OILFIELD EQUIPMENT COMPANY LTD.

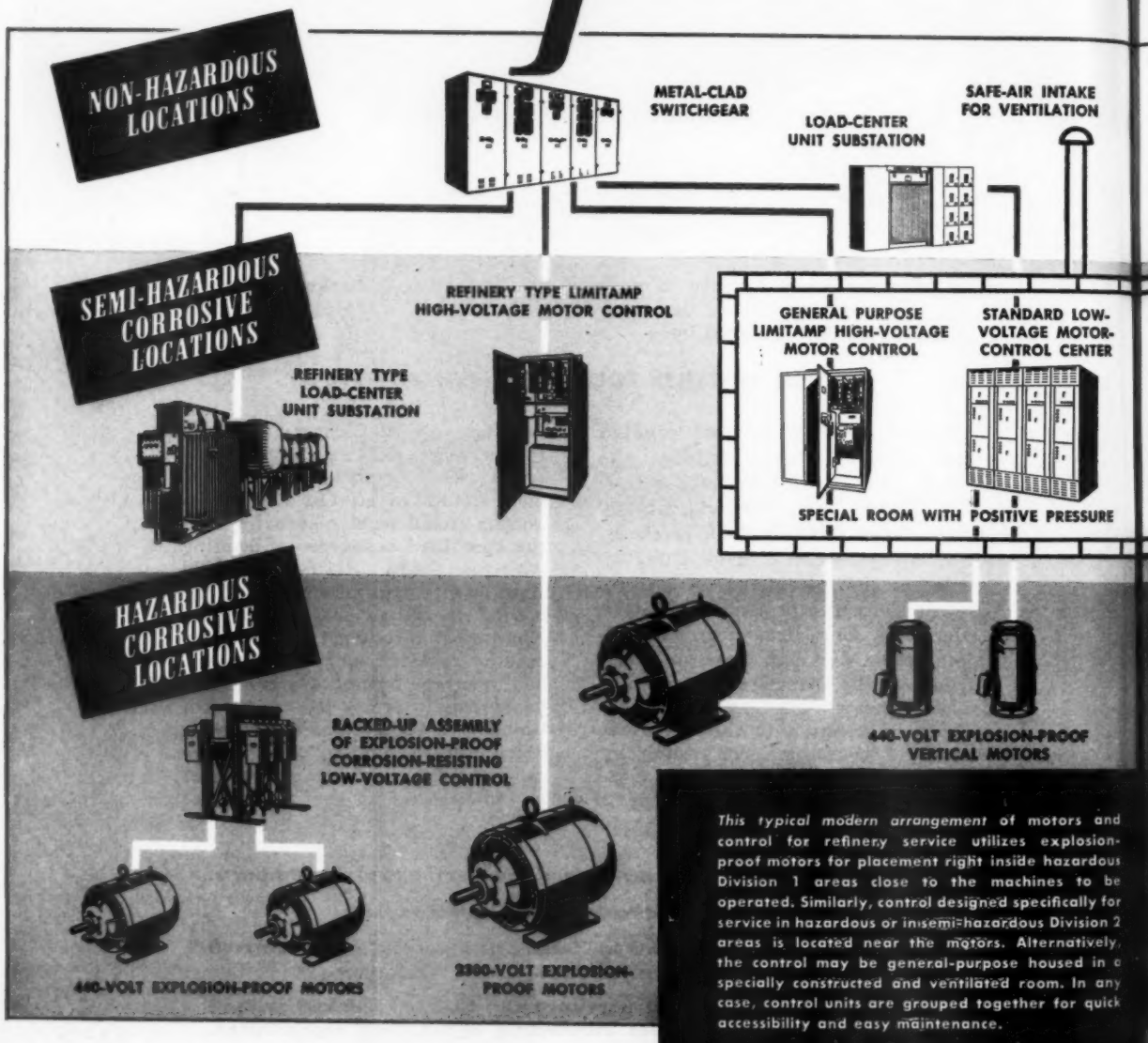
The range of Equipment covered by this Agreement includes the *Well Head Assemblies*, such as Casing Heads, Tubing Heads, Christmas Trees, *Drilling Control Units*, including the *Q.R.C. Blow-Out Preventers*, and Miscellaneous Drilling Control items etc., as referred to in detail in our Brochure, and explained in detail in Cameron's section of the American Composite Catalogue. *A Sales Agency Agreement* in addition to the Manufacturing License has been granted by Cameron to British Oilfield Equipment Co. Ltd., thus permitting a further range of Cameron products to be marketed in the Sterling Areas. This important announcement offers to all Oil Companies unique global service ensuring that the combined resources of leading American and British Oilfield Equipment manufacturers are embodied in an extensive range of Equipment produced after never ceasing research and development. The merger of the Sales and Manufacturing interests offer to the Oil Companies throughout the world a Sales and Servicing organisation incorporating unique advantages including —

- **Interchangeability of all British and American manufactured parts.**
- **Illustrated and numbered Parts List applicable to both.**
- **Manufacture under Cameron Technical supervision to Cameron Standards and A.P.I. specifications.**
- **Availability of Technical Service Field Engineers linked with a highly developed overseas Distributing and Agency organisation.**
- **The Cameron Guarantee extends to cover the complete range.**
- **A range of Equipment designed to cover any requirements of any drilling or production problem, and unequalled anywhere.**

Send for full descriptive literature covering your requirements.

The Largest All British Company Manufacturing Exclusively Oilfield Equipment

What's the trend in refinery electrification? } wider use of explosion-proof


NON-HAZARDOUS LOCATIONS
METAL-CLAD SWITCHGEAR
LOAD-CENTER UNIT SUBSTATION
SAFE-AIR INTAKE FOR VENTILATION
SEMI-HAZARDOUS CORROSIVE LOCATIONS
REFINERY TYPE LIMITAMP HIGH-VOLTAGE MOTOR CONTROL
REFINERY TYPE LOAD-CENTER UNIT SUBSTATION
GENERAL PURPOSE LIMITAMP HIGH-VOLTAGE MOTOR CONTROL
STANDARD LOW-VOLTAGE MOTOR-CONTROL CENTER
SPECIAL ROOM WITH POSITIVE PRESSURE
HAZARDOUS CORROSIVE LOCATIONS
RACKED-UP ASSEMBLY OF EXPLOSION-PROOF CORROSION-RESISTING LOW-VOLTAGE CONTROL
440-VOLT EXPLOSION-PROOF VERTICAL MOTORS
440-VOLT EXPLOSION-PROOF MOTORS
2300-VOLT EXPLOSION-PROOF MOTORS

This typical modern arrangement of motors and control for refinery service utilizes explosion-proof motors for placement right inside hazardous Division 1 areas close to the machines to be operated. Similarly, control designed specifically for service in hazardous or in semi-hazardous Division 2 areas is located near the motors. Alternatively, the control may be general-purpose housed in a specially constructed and ventilated room. In any case, control units are grouped together for quick accessibility and easy maintenance.

Here's what you need in motors and control for hazardous areas! }

WHEN YOU COME TO GENERAL ELECTRIC you get far more than the finest in electrical equipment. A General Electric application engineer, familiar with refinery practice, is at your disposal. If desired, he stands ready to take over the job of co-ordinating all the needed components, engineering your power distribution and utilization equipment into one modern, efficient system.

corrosion-resisting motors and grouped controls

—to simplify plant layouts, cut special construction costs!

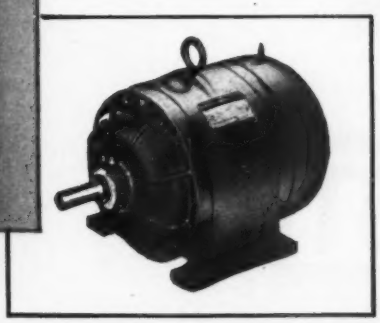
There are more ways than one, of course, to meet hazardous refinery conditions. But because it best combines simplicity, security, and savings, today's trend is toward greater use of explosion-proof, corrosion-resisting motors and group installation of control centers.

Its advantages? Motors and control can be located solely with reference to convenience, accessibility for maintenance, economy of space, and driving machinery. And because it's standard equipment, initial cost is lower.

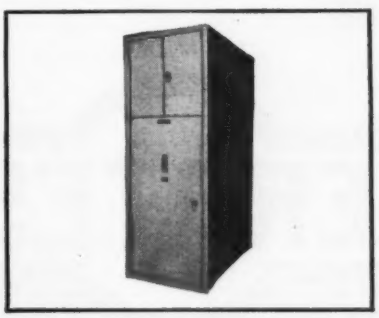
By minimizing explosion hazards, you promote personnel safety and continuity of production. Moreover, you can take full advantage of the cost-saving benefits of the load-center system of power distribution. Full information on motors and control for hazardous areas is contained in Bulletin GEA-4131. We'll gladly send you a copy. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

Have you seen the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution"? Ask your G-E representative to arrange a showing for your organization.

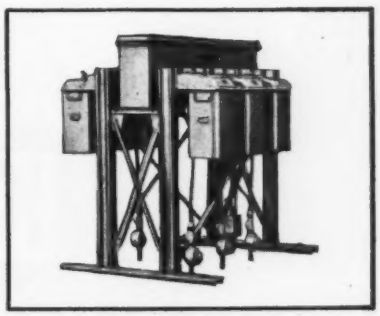
To meet refinery conditions and code requirements for hazardous areas, General Electric builds the most extensive line of explosion-proof motors on the market, in the widest variety of types, sizes, and ratings, and for the greatest number of hazardous conditions. In high- and low-voltage control, too, you have an unusually broad range to select from, made especially for use in hazardous and corrosive atmospheres. Let an experienced G-E engineer help you select the right combination for *your* special needs. Take the first step now—just call him at your nearest G-E office.



G-E Tri-Clad explosion-proof motors for Class I Group D hazardous locations have strong cast-iron frames and end shields. Non-sparking Textolite cooling fans standard on smaller sizes for greatest corrosion resistance.



G-E Limitamp high-voltage motor controls for semi-hazardous Class I Group D Division 2 areas—factory-assembled, space-saving units—give adequate short-circuit protection with high-IC current-limiting fuses.



G-E low-voltage control for hazardous Class I Group D Division 1 areas—in these convenient, racked-up standard assemblies of combination starters and breakers—save installation time, simplify maintenance.

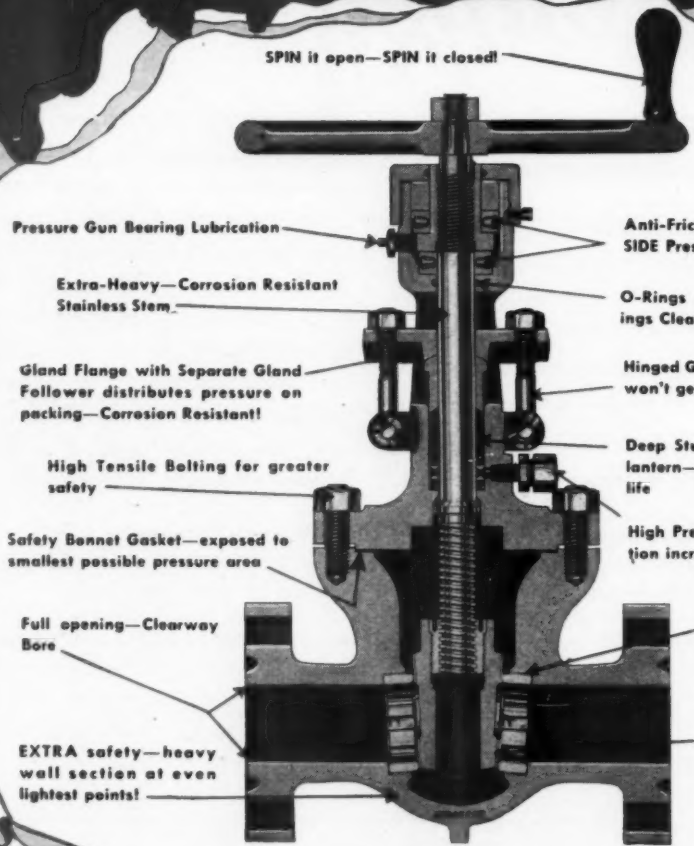
GENERAL ELECTRIC

GEI-5

XUM

NEW!

FOOLPROOF • RUGGED • DEPENDABLE • EASY-TO-OPERATE!


SPIN it open—SPIN it closed!
Pressure Gun Bearing Lubrication
Anti-Friction Thrust Bearing—OUTSIDE Pressure Chamber
Extra-Heavy—Corrosion Resistant Stainless Stem
O-Rings exclude dirt, keep Bearings Clean
Gland Flange with Separate Gland Follower distributes pressure on packing—Corrosion Resistant!
Hinged Gland Bolts—easy to use—won't get lost
Deep Stuffing Box with Lubricator lantern—standard packing—longer life
High Tensile Bolting for greater safety
High Pressure Buttonhead Lubrication increases packing life
Safety Bonnet Gasket—exposed to smallest possible pressure area
Perfect Shut-off—ground faces—Long life corrosion resistant heat treated 12-14 Chrome Stainless!
Full opening—Clearway Bore
Hard Faced Discs—less friction—easy operation—less wear
EXTRA safety—heavy wall section at even lightest points!

KEROTEST

FLOWLINE MANIFOLD

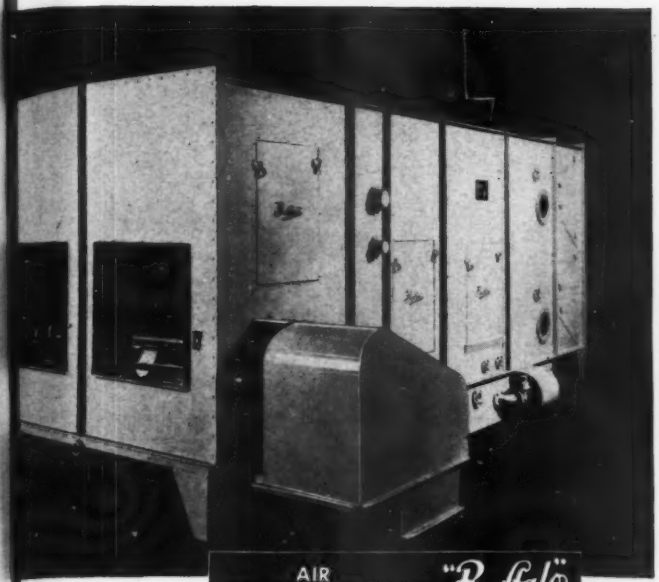
VALVES

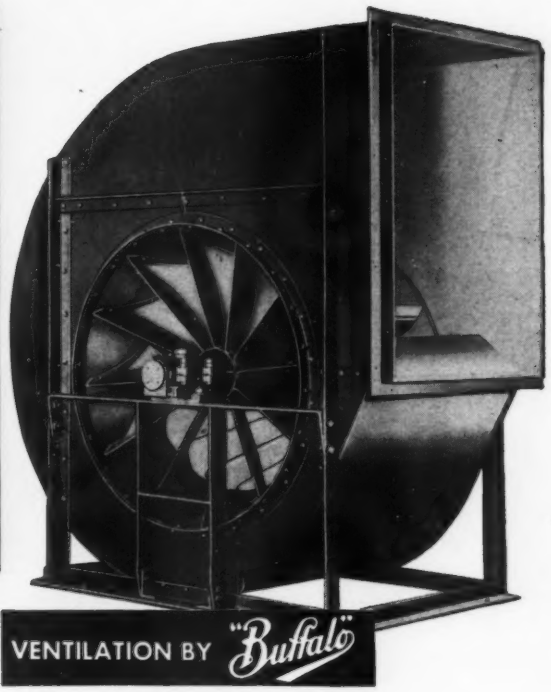
WRITE for descriptive bulletin

KEROTEST MANUFACTURING CO., PITTSBURGH 22, PA.

Offices and Warehouses: New York City • Houston, Texas • Chicago, Illinois • Tulsa, Okla. • Charleston, W. Va.
Los Angeles, Calif. • Odessa, Texas
In Canada, Manufactured and Distributed Exclusively by The Canadian Fairbanks-Morse Co., Ltd., Montreal

Which is your best buy?





"Buffalo" Can Advise You Without Bias . . .

Generally, the more you want done with your plant air, the more you need some form of air conditioning. Thorough dust control, humidifying, cooling call for one of the several types of "Buffalo" Air Washers. General comfort conditioning, including heating, cooling and air cleaning call for PC Cabinets. Have a "Buffalo" Engineering Representative advise you, for best results, and write for Bulletin 3703.

Often, for comfort or process control, *ventilation* will do the job. You can exhaust hot, stale air from a working area, or blow in fresh air. Moreover, air circulation by itself has a cooling effect. BULLETIN 3675, below, describes the widely used "Buffalo" Limit-Load Fan, your most efficient method of ventilating large areas. WRITE FOR YOUR COPY, and find out from your nearby "Buffalo" Engineer the many ways you can put ventilation to work in *your* plant!

FAN ENGINEERING, 5th Edition, gives you 808 pages of authoritative facts on air and its uses. A convenient pocket-size manual, a reference widely used by the industry. Order NOW! $6.00 Postpaid in U. S. A.

BUFFALO FORGE COMPANY

725 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Branch Offices in all Principal Cities

THIS, THE SEVENTH in the 1950 series of Standard Oil institutional advertisements, tells the public about the ownership of the company by its 96,800 stockholders, and the importance of their contribution in helping provide jobs for 46,700 people.

META A. SUDBROCK AND MRS. JOSEPH L. KOTARSKI chat with receptionist Doris J. Becich while waiting for the annual meeting of Standard Oil stockholders to begin. All of our 96,800 owners are invited to attend the annual meeting—but if all of them were to come, we would have to hold the meeting in an arena about the size of Soldier Field on Chicago's Lakefront.

WE SEND MONEY TO 40,000 WOMEN

To be exact, there are 41,458 women among the owners of Standard Oil. We are glad to send them their dividend checks, because if it weren't for their investment with us we couldn't provide so many jobs, make so many products so well, or take care of so many customers.

Besides the ladies, Standard Oil has as owners 36,100 men, 175 educational institutions, 185 charitable organizations, hundreds of insurance companies and business firms—a total of 96,800 owners in all. No one man or woman owns as much as 1% of our stock; no institutional owner has as much as 5%.

In 1949, our 56th consecutive year of dividend payments, stockholders were paid dividends having a value of $2.69 per share—a return on money provided to create jobs and make production possible. The 46,700 employees of Standard Oil and its subsidiary companies averaged $4,600 in wages and benefits. Their high earnings were due not only to their own skills, but also to the fact that each one of them has behind him an average of $30,100 in tools and equipment.

A business like ours, you see, means large numbers of people—lots of employees, lots of owners, lots of customers. Business depends on their work and their money. They depend on business for wages, for dividends and for useful products of all kinds.

STANDARD OIL COMPANY (INDIANA)

FOR EIGHTEEN YEARS, Mrs. Walter Johnson of Fargo, North Dakota, has been enjoying dividends from the Standard Oil stock she purchased in 1932. The steady return from her investment helps make it possible for her to pursue her spare-time interests.

ANOTHER of our 96,800 owners is Melba Taylor of Indianapolis, Indiana. As to anyone who has invested in the ownership of a large and useful corporation it is reassuring to Miss Taylor to know that Standard Oil has paid dividends each year since 1894.

AS A WIDOW, Mrs. V. E. Webb of Glen Ellyn, Illinois, knows the importance of sound investment. The dividends she receives from her Standard Oil stock help her to maintain her home and to follow her hobby of fancy needlework.

ESTHER ANDERSON of our Minneapolis office, is one of the thousands of Standard Oil employees who are also among our 96,800 owners. Like any other owner, employees buy stock on a purely voluntary basis, putting their money to work where they work.

They Say—

"War Rolls on Oil"

"The attitude of our Government toward the development of our basic mineral resources in the past is disgraceful. Instead of helping, it has turned its back on the rich resources lying in the mountains and ground across the country.

"While discouraging domestic development, ultimately closing and ruining many of our mines, on the other hand it has poured billions into foreign countries for the opening of activities in direct competition to ours.

"I have consistently fought this stupid policy, and have urged a progressive domestic program for conserving our natural resources. Recently I backed a bill to encourge tin mining in our country, but to no avail. Later when we asked for an appropriation to keep our mines going and to stockpile strategic materials what happened? The bill was defeated but another appropriation was approved sending millions to Africa and South America for mining projects.

"Reliable sources say Colorado has sufficient coal stored in the ground to supply world demands for hundreds of years. An excellent grade of oil can be made from coal shale. Should not our nation be developing this rich resource? War machinery rolls on oil. Domestic and industrial uses for oil are steadily increasing.

"Without vast known mineral resources, no modern nation can survive. Reports say $3,000,000,000 of mineral wealth has been taken from the Rocky Mountains since 1859. There is as much more still there which can be removed and used if the Government will lend a hand. Today's emergency and common sense call for action in utilizing our mineral and oil resources for the good of the country."

Rep. William S. Hill, Colorado, speaking in the House of Representatives.

"The State's Ahead"

"Most Labor Day motorists probably came home with considerable less money in their pockets than when they left, but the (Indiana) state treasury came out ahead of the game. Some $345,000 in state gasoline taxes went into the state coffers as a result of motoring activities over the week end.

"About 1,059.450 cars . . . consumed an estimated 8,640,000 gal. of gasoline

ANCHOR PRESENTS

a LITTLE HEATER

5½" x 11" x 24" — 25,000 BTU

with a GIANT OUTPUT

Model 10 and Model 11* (vented) heaters are ideal for lease houses, pumpers' shacks, tool and change houses and the many other spots where space will not permit use of larger heaters.

Made of heavy gauge steel and equipped with three L-1 Anchor burner heads, it burns either natural or LP-Gas. It is finished with heat-resistant aluminum paint.

The corrugated top and sides are specially designed to provide maximum heat radiation. The flame is completely enclosed for greater safety. *Model 11 has standard 3" crimped opening for vent on back of stove for use where regulations require or it is desirable to carry off noxious or harmful fumes.

Protect your men against colds . . . safeguard your property against makeshift heaters and open fires, with these extremely low priced, high heat output Anchor gas heaters.

25,000 BTU CAPACITY

THREE L-1 ANCHOR BURNER HEADS

BURNS NATURAL OR LP-GAS
(Specify when ordering)

SIZE: 5½" x 11" x 24"

EASILY PORTABLE

ASK YOUR SUPPLY STORE OR WECO REPRESENTATIVE

WELL EQUIPMENT MFG. CORP.
A Subsidiary Of Chiksan Company
HOUSTON 1, TEXAS
Exclusive Sales Representative Outside Mid-Continent Area
CHIKSAN COMPANY
Brea, Calif. Chicago 3, Ill. Newark 2, N. J.
Export Sales: CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

WECO

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

XUM

9-K-15A

Wherever pipes meet, permanently

IN THE PETROLEUM FIELD,

the right answer to every temperature, pressure and corrosion resistance fittings problem is W-S Screw End and Socket Weld Forged Steel Fittings.

Basic materials are selected from a wide choice of carbon, stainless and alloy steels. Designs are carefully engineered. Fittings are drop forged for strength . . . precision machined for accuracy of finish, and instrument inspected for perfection of threads, sockets, angles and concentricity. Investigate them today.

Write for Bulletin A3-50. For information on Stainless and Alloy Steel Fittings, ask for Bulletin S-1.

SOLD THROUGH LEADING DISTRIBUTORS EVERYWHERE

SPECIFY...

W-S

FORGED STEEL FITTINGS

DISTRIBUTORS PRODUCTS DIVISION, ROSELLE, NEW JERSEY

WATSON-STILLMAN Established 1848

Designers and Manufacturers of Forged Steel Fittings, Valves, Wire Rope Shears, Hand Pumps, Jacks, Pipe Benders and Hydraulic Equipment

while traveling some 127,872,000 miles. . . . Indiana motorists paid a total of $475,200, of which $129,600 went to the federal Government and $345,600 to the state.

"Indiana motorists, who are conceded to be among the heaviest taxed groups in the state, found no respite from gasoline taxes over the (Labor Day) week end. These taxes add heavily to the cost of running our automobiles, whether for business or pleasure."

—*The Hoosier Independent, September 1950.*

Determining Factors

"Gasoline is necessarily manufactured on the very large scale of about 2½ million barrels per day in order to meet the needs of nearly 45 million motor vehicles. The building of new motor vehicles is also a big operation; in addition, they are highly complicated mechanisms. Any changes, in either fuel or vehicle, must therefore be executed in comparatively small, carefully worked-out steps.

"Over a long period these steps lead to more useful, more acceptable, and more efficient combination of fuel and vehicle. To this point, the generally accepted system of two gasoline grades makes it possible to support engine development and at the same time economically meet the needs of the great bulk of cars whose octane requirements are less stringent.

"However, the performance standards chosen by the using public are the real factors determining fuel requirements of the individual vehicle and hence volume of fuel purchased.

"While advances in gasoline manufacture will continue to aid in making the motor vehicle more useful to its owner, its over-all fuel consumption —and therefore gasoline tax revenues —will be primarily determined by extent and nature of use. Improvements in fuel quality will have only a very gradual effect, which will become apparent over a long period of time."

Dr. D. P. Barnard, research coordinator, Standard Oil Co. (Ind.), speaking at the annual meeting of the North American Gasoline Tax Conference, St. Paul.

On the "Q-T"

Sir:

"We have read with a great deal of interest the article 'Effectiveness of Additives in Various Kinds of Oils' which appeared in the September 7, 1950, issue of The Oil and Gas Journal. This article is included in the section headed 'Questions on Technology' and begins on page 88 of the issue referred to.

"We would like very much to have additional copies of this article, and

PELTON Jacks are available in 7 models with polished rod load ratings from 20,000 to 40,000 pounds. Stroke lengths 20, 25 and 30 feet.

OIL PRODUCTION DOUBLED* WITH PELTON LONG STROKE Hydraulic Pumping Jacks

PRODUCTION CALCULATIONS
SHORT STROKE VS PELTON LONG STROKE
Equal Polished Rod Travel

	Short Stroke	Long Stroke
Upward Polished Rod Travel	740 in. per min.	740 in. per min.
Surface Stroke Length	74 in.	360 in.
Strokes per Minute	10	2.05 (A)
Pump Setting	8400 ft.	8400 ft.
Bottom Hole Pump Plunger Diameter	1¾ in.	1¾ in.
Acceleration Factor (Mills Formula)	1.104	1.021
Peak Polished Rod Load	26,437 lbs.	24,986 lbs.
Maximum Stress in Top Sucker Rod	33,677 psi.	31,829 psi.
Sucker Rod Stretch	54 in.	54 in.
Bottom Hole Pump Plunger Overtravel	10 in.	2 in.
Net Bottom Hole Pump Plunger Travel	30 in.	308 in.
Per Cent Surface Stroke LOST through Sucker Rod Stretch after Correction for Overtravel	59.5%	14.5%
Production in Barrels per Day at 100% Bottom Hole Pump Volumetric Efficiency	107	225 (A)

* Increased production due to the long surface stroke equals $\frac{225}{107} \times 100 = 210.2\%$

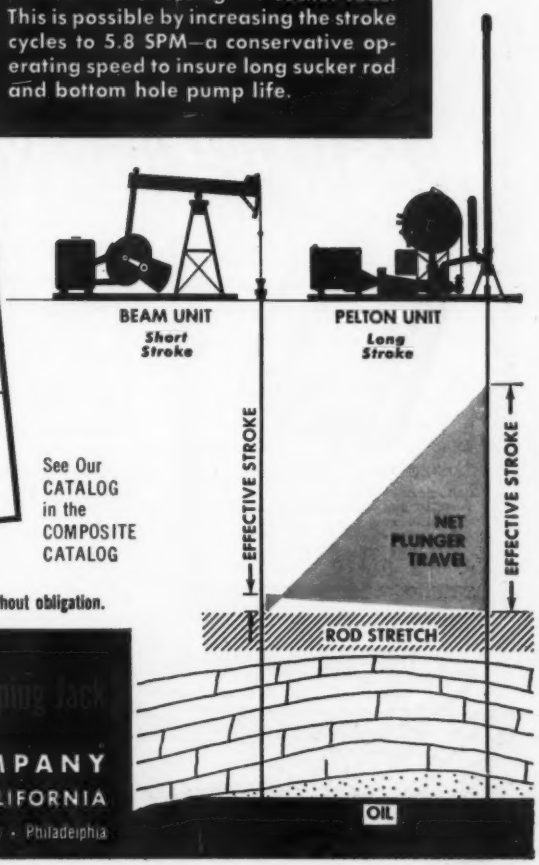
Above calculations based on using a tapered 1", ⅞" and ¾" Sucker Rod String, 10° API gravity fluid, fluid level at the Pump.

NOTE (A): The 360" stroke Hydraulic Unit may be operated at 5.8 SPM increasing the production to 669 B/D if required, while maintaining satisfactory sucker rod stresses.

IT'S THE EFFECTIVE STROKE THAT COUNTS

The table illustrates how the Hydraulic Long Stroke can double production through minimizing the effect of rod stretch.

As can be seen from note "A," a still further increase in production may be realized with the PELTON Jack without overstressing the sucker rods. This is possible by increasing the stroke cycles to 5.8 SPM—a conservative operating speed to insure long sucker rod and bottom hole pump life.



See Our CATALOG in the COMPOSITE CATALOG

SEND FOR APPLICATION DATA SHEET. Complete recommendations furnished without obligation.

PELTON Long Stroke Hydraulic Pumping Jacks

THE PELTON WATER WHEEL COMPANY

2447 EAST 54th STREET • LOS ANGELES 58, CALIFORNIA

District Offices: Los Angeles • San Francisco • Dallas • Houston • New York City • Philadelphia

XUM

Snap-on*

twenty-one piece • 1" Square Drive

Extra Heavy Duty Socket Set

LOXOCKET CONSTRUCTION
A positive-acting button-lock makes any combination of units as safe as a one-piece wrench. Easy release allows you to interchange sockets swiftly and easily.

THESE tools give you the extra power and leverage to break loose big rusted-on nuts and bolts, or to pull them up to the tightest degree. It is a husky set that speeds the heaviest nut-turning work with great safety because of the famous Loxocket design.

No. 521-EHD-B Set includes 17 Hexagon Loxockets from 1-7/16" to 3-1/8". The handle equipment consists of a Ratchet Head, Sliding Bar and two Extension Bars, 8" and 16" long.

*T M Reg U S Pat Off

SNAP-ON TOOLS CORPORATION
8098-J 28TH AVENUE
KENOSHA, WISCONSIN

will appreciate your sending us four complete sets of tear sheets. . . ."

L. W. Mendenhall,
National Aluminate Corp.,
Chicago.

Russia Wants Oil

The present aim of President Truman is to keep the Korean war localized. U. S. policy at the moment is geared to not provoking Communist China. Earlier Secretary of State Acheson reemphasized that the United States has no aggressive designs in Asia. But we are afraid there is a thorough misunderstanding of what Russia's aims are. What she is after is the oil lands of the entire East.

What Russia has avoided at the present time is a war in Iran. This has been prevented at present because it would stir up Britain as well as the United States. That is very rich oil territory, and oil is what Russia wants as much as she wants anything else.

There is no more valuable commodity in war than oil. It supplies the ships and the airplanes and much of the power that is needed to move men and war materials. There is one oil field in Russia, but it is not great, and if the United States were not forced into the last war through the attack on Hawaii, Russia would not have won.

There is little doubt that when Russia gets ready to fight the United States, Britain, and France, her aim will be to attack the countries in Asia where oil is plentiful. Today oil is the most valuable commodity for use in war. It is so much of that, that Russia will not be satisfied until she has her share of it.

So this is what Russia wants, and which she will make every effort to win.

Editorial in the Oil City (Pa.) Derrick.

Informational Duties

"In today's world, no company can long survive without good advertising. Merely having superior products, processes, and services to offer is not enough. The world must be informed of their availability. Competition is keen, and any company which does not make itself known is left in obscurity despite the high value of what it may have to offer.

"Good public relations are also exceedingly important today when business in general is held as highly suspect in the minds of many. Every company has the duty of keeping the public informed on what it is doing, how it operates, and what its operation means in benefits to everyone. A company such as ours has a further duty in the publication of technical articles which are vital to the progress of science and engineering."

Dr. Gustav Egloff, Universal Oil Products Co., at company dinner in Chicago, September 29.

gages you CAN'T "MISREAD"

PENBERTHY Reflex GAGES prevent mistakes

There can be no doubt about the liquid level . . . no question whether the gage is empty or full . . . when a Penberthy Reflex Gage is used. The empty space always shows white and the liquid always shows black. It cannot be otherwise because of the unvarying natural law of the refraction of light. You can easily read the Penberthy Reflex Gage as far as you can tell the difference between black and white.

In addition to standard units, Penberthy Reflex Gages are also fabricated to customer's specifications from special alloys to meet unusual corrosive and temperature conditions. A complete line of flat glass transparent gages and tubular gages is also available. Penberthy Gages conform with API-ASME requirements. Ask for a copy of new Catalog No. 35.

4150

PENBERTHY PRODUCTS

PENBERTHY INJECTOR COMPANY

DETROIT 2, MICHIGAN

Established 1886 *Canadian Plant, Windsor, Ontario*

101 trained field men

They KNOW!

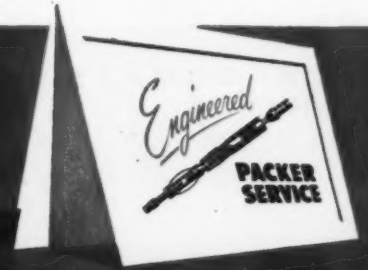
...that's why they can give you FREE, honest, unbiased and factual answers to all of your packer problems.

"THEY" are the Lane-Wells field men — 101 of them — every man-jack a packer expert, intensively trained to give you "Engineered" Packer Service.

What *is* Engineered Packer Service? Briefly, it is a service which blends latest engineering data with field experience to remove guesswork and "rule of thumb" from all phases of packer application. Available to any operator on request, with no cost or obligation, and without regard to make of equipment used, Engineered Packer Service gives field-proven, *engineered* answers to these seven major packer problems:

1. Do I Really *Need* a Packer? Analysis of well conditions and operations frequently discloses that another piece of equipment will serve you better than a packer. If so, your Lane-Wells man will tell you frankly.
2. What Can a Packer Do For Me? Lane-Wells field men can work out, with you, packer set-ups to handle a wide variety of operations.
3. Which is the *Right* Packer? Your Lane-Wells man, thoroughly trained in all phases of packer applications, will recommend the type and size of packer which meets *your* well conditions and *your* operations.
4. What About Setting the Packer? Working with field-proven engineering data, your Lane-Wells man will help you determine a setting tailored both to your present well conditions and to future operations.
5. Just How Shall We Pull This Packer? Wide experience and up-to-the-minute training enable Lane-Wells men to work out procedures that pull the packer without parting the tubing.
6. Am I Getting the Most From My Packer? Your Lane-Wells man can review your packer set-ups, evaluate their efficiency, and show you just what to expect of a good packer.
7. Is This Packer Still Usable? Many used packers have been saved for further service by Lane-Wells packer experts advising on proper maintenance and on reconditioning in the field and in the shop.

This can give you only a small picture of Engineered Packer Service. Your Lane-Wells man can give you the complete story — call or write him, today.



...by...

LOS ANGELES • HOUSTON • OKLAHOMA CITY

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TECHNICAL OIL FIELD SERVICES

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Lane-Wells Canadian Co. in Canada • Petro-Tech Service Co. in Venezuela

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JOURNALLY Speaking

History, Old and New

PIPE LINERS are used to digging under roads, through fences, and even around churches, but the crew which laid Tapline in the Middle East actually dug through a church. It was a Greek Orthodox church built near Tapline's Sidon terminal, circa 532 A.D. The reason for this desecration was that the church was 3 ft. under the ground and only the floor was left, probably as the result of a disastrous earthquake known to have occurred in those parts in the year 551.

But that floor was something special. It was an elaborate and beautiful mosaic showing birds, animals, and flowers. The Minister of Antiquities of the Republic of Lebanon helped dig it all up and relaid it in the National Museum. Then the Tapline crew resumed digging and farther down found the foundations of another building and some Phoenecian burial urns, from which it was deduced that the spot had been a place of worship in 2,000 B.C.

In this way oil men are helping to fill in gaps in the ancient history of the Middle East as well as writing a new chapter there.

Honorable Doodlebug

FOR some reason or other all information about doodlebugs gets routed to this department, and now we are getting news from abroad. The latest arrival is an excerpt from a paper in Akita, Japan, reporting that an oil well will soon be drilled in Chiba Perfecture which heretofore has produced only dry gas. It adds that the man who discovered the oil is Juno Kajikawa, who was a technical consultant for Kuhara Mining Co. in Mexico. We can do no more than present the rest of the article as it came to us:

"The device used by Mr. Kajikawa is very unique and a peculiar type of machine. The device consists of batary with small apparatus which kept attach to the hip by a belt. When the apparatus happen to come just above the oil bearing horizon or an oil reservoir a suspending string which attach to the apparatus commences to rotate circular form around the machine as a centre. But on the other hand no oil reservoir found in underground the attached device with string remains stationally and points straight to the ground.

"Mr. Kajikawa uses further improved device which enable to locate the exact position of oil reservoir. It was said that Well No. 1 of Ube of the Ube Mining and Petroleum Company was located by the similar method. At that time the well was rather wildcat in nature but produced by own pressure (self flowing well). It was reported also that the well No. 7 of the Fuji Mining Company also located by Mr. Kajikawa with the same apparatus. He contended that whenever I said there is oil there will have oil in the underground and he said, in case should fail to produce oil where I have located well, I will give you my head—and produced 0.2 kiloliter of oil in fact.

"People say if the device used by Mr. Kajikawa will succeed, all the modern prospection by the geophysical method will be useless and geologists and geophysists will be worth nothing.

"Onuki Mura, Chiba Prefecture is the native country of Mr. Kajikawa so that he has some form of reasonable fact when he emphasize that the vicinity of the place is petroliferous area."

Instard Reeder

OUR Circulation Department recently received the following communication: "Iam instard in the oil & gas bwessnes, and also pipe lines. I wood like to scrabe for the oil and Gas Journial. Wood you please send me one, or a year of scrapion, and I will send you the money for it."

We doubt that this man will really be "instard" in some of the long-haired technical articles in our engineering section, which are the pride and joy of our brains department, but we are glad to see that our favorite oil publication has a sufficiently universal appeal to be sought after by the less erudite in the "bwessnes."

—Henry D. Ralph

XUM

Since 1936
STAR PERFORMANCES
IN DEEP-WELL CEMENTING
● Always uniform—principal reason for the star performance of 'Starcor' in deep-well cementing ever since 1936.
Providing the properties essential for successful deep-well cementing jobs . . . kept abreast of changing requirements in the fast-moving Oil Industry . . . outstanding quality always . . . sound assurance of successful completions, as 'Starcor's 15-year record in thousands of wells clearly shows.
'Starcor'* is one of a family of high-quality, always-uniform Lone Star Cements—backed by continuing research—select the cement that fits your job.
*Reg. U.S. Pat. Off.
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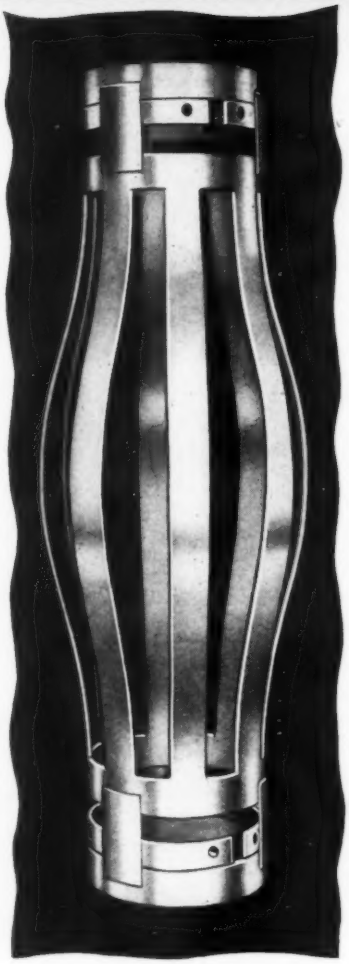
"TORTURE TESTING" definitely proves Baker Model "G"



Casing Centralizers provide MAXIMUM CENTERING FORCE

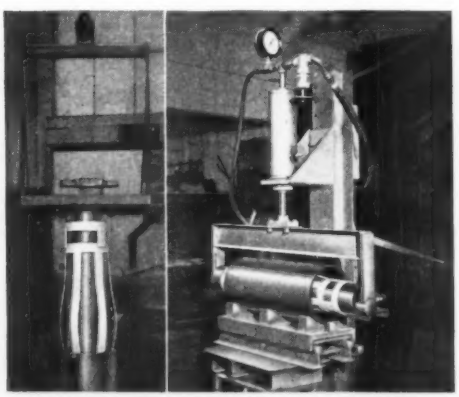
Only when "maximum centering force" is applied to casing at the cementing point, can you obtain a sufficient annular space to permit uniform distribution of the cement slurry completely around the casing. The hazard of channeling is minimized, and chances for successful "first time" cementing are increased.

The test of any casing centralizer is its ability to exert MAXIMUM CENTERING FORCE *after* repeated flattening of its springs during the trip down-hole. That's why the Baker testing laboratory has been kept in constant use during the designing, development and actual proving of the Baker Model "G" Casing Centralizer. Comprehensive tests, simulating every conceivable hole condition to which a centralizer is subjected, were performed in arriving at its efficient design.

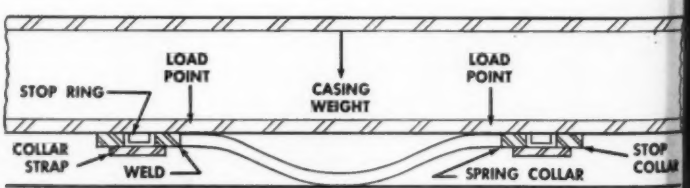
During the course of these tests, every type of spring-equipped centralizer was studied. The exclusive design of the Baker Centralizer proved conclusively to be the optimum.

And here are the outstanding features of the Baker Model "G" Casing Centralizer confirmed by "torture testing" . . . 1. Its MAXIMUM CENTERING FORCE is exerted when it reaches the cementing point, regardless of how many times the springs have been flattened due to "dog legs" or tight spots in the hole. 2. The springs are securely butt-welded to the spring collars in a design that imposes the load point *upon the casing.* 3. *All springs compress simultaneously,* and cannot be compressed individually. 4. The *casing can be rotated* while the centralizer remains stationary. 5. It starts easily, without "snubbing." 6. All parts of the assembly are pre-positioned, ready for immediate, easy installation on the casing.

Ask any Baker representative or office for *your* copy of the new 16-page brochure which contains complete details and illustrations of the Baker Model "G" Casing Centralizer.



LEFT: Testing to determine the maximum number of springs of optimum bowed height to permit easy starting without "snubbing." RIGHT: With this testing device it is possible not only to simulate rugged down-hole travel by repeatedly flattening the springs, but also to find the effective centering force of the centralizer in the open hole after such treatment. The MAXIMUM CENTERING FORCE can easily be determined from a performance curve showing the centering force at various intervals of deflection.



Here is the ideal in spring design and mounting, found only in the Baker Model "G" Casing Centralizer. Note how the load point is imposed directly upon the casing; and how the properly "contoured" spring is free to move along the smooth surface of the casing as it deflects under compression. There is no chance for concentration of stress to cause a permanent set, or breaking of the spring. Note that ample clearance exists between Stop Rings and Centralizer Collars to accommodate the increased length of the springs that results from their complete flattening.

***Remember!* You get MAXIMUM CENTERING FORCE only with BAKER Model "G" CASING CENTRALIZERS**

BAKER OIL TOOLS, INC. HOUSTON • LOS ANGELES • NEW YORK

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Good Job

Congratulations are due all around to the National Petroleum Council, the Department of the Interior, the oil industry, and the oil-using public because of the control organization now emerging in Washington.

The Petroleum Administration for Defense is a government agency, clothed with the authority of the Defense Production Act. But it is cast in a mold fashioned by the NPC on behalf of the entire petroleum industry. It took a real fight to accomplish this, for a determined clique of government officials almost succeeded in saddling the industry with a typically bureaucratic control plan blanketed under an omnibus agency.

The PAD is founded on three principles: The petroleum industry is so vital and so different from other industries that its defense problems should be handled separately and as a unit; it is to be operated by active oil men drawn directly from the industry; controls are to be imposed only as, when, and where needed.

With this sort of setup the industry can devote its attention to delivering the oil the nation requires, without worrying about what Washington is trying to do to it. Before this pattern became clear, oil men were making statements to the effect that they didn't mind fighting for Uncle Sam but hated to have to fight him too.

The Interior Department should be happy about this. It didn't lose any of its powers. It avoided a lot of administrative headaches and frictions by turning the oil job over to experts who know the score. It also stands to gain the willing cooperation of the industry where it might have engendered suspicion, antagonism, and even opposition.

The public will gain from this because it is assured of adequate supplies of all petroleum products to the fullest extent possible in an industry unhampered by unnecessary or poorly conceived controls. The oil men running PAD can be trusted to see to this, for they are only temporary bureaucrats and hope to go back to a competitive and respected business.

The job facing the oil industry now is to fulfill the PAD promise by contributing the high-caliber personnel needed to staff it and by cooperating in all its requests and directives.

In typical oil-industry fashion, PAD is concerning itself with first things first, and not crossing bridges prematurely. Its immediate problem is military aviation gasoline, and this segment of the industry is the only one touched by its directives. Its plan for meeting this problem is practical and direct, one which could come only from intimate knowledge of the complexities of petrochemistry and refinery operations. The industry is satisfied with it, and so is the Government. What more could be needed?

Under this program of the minimum amount of controls required for a given defense problem when it arises, the industry can be confident of its ability to meet all requirements. It looks like a good job all around.

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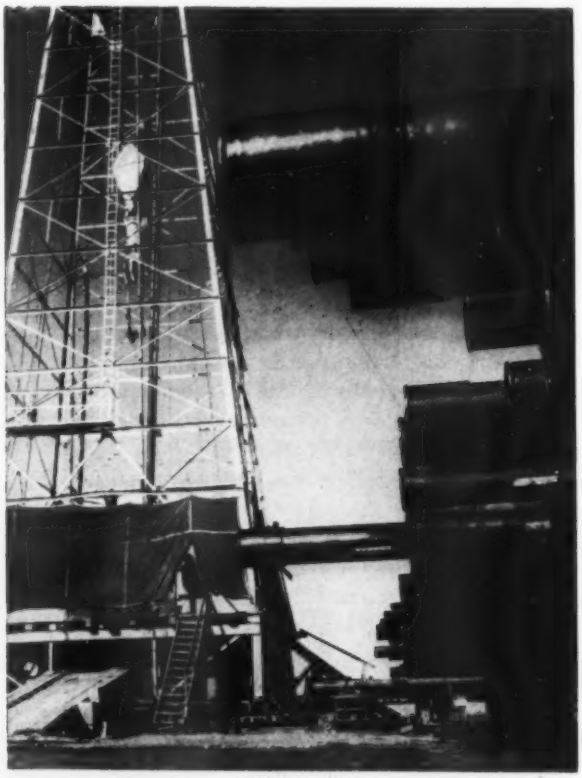
THIS WEEK

INDUSTRY—A.A.O.D.C. looks forward to greatest drilling campaign in U. S. history. . . . Confidence expressed that petroleum needs can be met providing steel is made available to carry out exploration programs. . . . Drillers have an optimistic view of future, but hinge it all on availability of drill pipe, casing, and other equipment. . . . ¶Petroleum Branch of A.I.M.E. hears discussion on oil for an Asian war and politics in the gas business. . . . ¶FPC rejects two major proposals for natural-gas service to New England area, and flays "selfish interests" of companies concerned. . . . Door left open for future proposals, however. . . .

STEEL—Shortages cropping up in all tubular goods for petroleum industry. . . . Gray market reported appearing in several areas as operators and contractors find it increasingly hard to find materials. . . . ¶New priorities and allocations controls expected to be set up by NPA. . . .

AVGAS—Problem of increasing aviation-gasoline output is placed in laps of refiners by PAD. . . . Secretary of Interior Chapman urges voluntary program to step up production by 25,000 bbl. daily. . . . Refiners asked to transport alkylates to other plants where they can be utilized to the best advantage. . . . ¶Airlines will be hit by shortages of alkylates, and quality of fuel will have to be lessened in order to meet increasing military demands for higher quality gasoline. . . .



DRILLING STEEL.—A plentiful supply of casing stacked by a rig, as in this picture, may be a rare sight in coming months if fears of many oil men are borne out. The drilling contractors' convention this week was told that the steel situation will get worse before it gets better but that government authorities promise allocations for drill pipe and casing sufficient for the biggest drilling program in history.

SUPPLY—No gasoline or fuel-oil shortages appear likely for civilians as result of defense program or continuation of military activity on scale of Korean War. . . . Analysis of Government's program, forecast of civilian requirements, oil industry's ability to meet demands assure this. . . .

WASHINGTON—Petroleum Administration for Defense formally established by Interior Secretary Chapman. . . . Hugh A. Stewart, OGD director, is acting head. . . . Agency's powers and limitations set by official orders. . . . ¶NPA plans to call for increased stockpiling of short materials by industry to aid in meeting military contracts. . . .

ACTIVITY—Crude production for week ended October 7 averaged 5,800,775 bbl. daily, down 39,825 bbl. daily from previous week because of lower allowables in Texas. . . . ¶Well completions for the week totaled 825 compared with 872 for previous week and 716 for same week last year. . . . A total of 163 wildcat wells were completed compared with 164 for previous week. . . . ¶Rotary rigs operating in United States on October 2 gained 35 rigs to 2,267, the highest level since the last part of December 1948. . . .

TRENDS—Supply of crude and products reached the all-time high of 7,220,000 bbl. daily in September, based on weekly data. . . . Production of crude and field condensate averaged 5,900,000 bbl. daily. . . . Production at natural-gasoline and cycling plants is estimated at 500,000 bbl. daily. . . . Imports averaged about 820,000 bbl. daily. . . . ¶Total crude and product stock increase for the month is estimated at 18,000,000 bbl. . . .

INTERNATIONAL—First oil discovered on Argentine side of Tierra del Fuego, at southern tip of South American continent. . . . ¶Colombian well makes 650 bbl. daily on test. . . . ¶Assam earthquake damage to oil properties of Assam Oil Co. limited to storage tanks. . . . Refinery operations undisturbed by violent tremor. . . . ¶German test in Scheerhorn area finds oil. . . . ¶Testing operations under way on Tapline. . . . Artery is now being filled with oil. . . .

PINE LINES—Equitable Gas Co., Pittsburgh, to spend $1,684,700 on extension of its pipe-line system. . . . ¶Shaw Construction Co. awarded contract to lay 61 miles of 16-in. from Windsor to Dawn, Ont., to provide Union Gas of Canada with natural gas. . . . ¶MidSouth Gas Co. authorized to buy pipe-line system of Arkansas Power & Light Co. . . . ¶Mississippi River Fuel Corp. to spend $5,500,000 on expansion to increase flow of natural gas in its system. . . .

REFINING—Supply of Pennsylvania Grade bright oils and viscous neutrals halved by 7 months of steady decline. . . . ¶Work under way on new 610-ft. dock for Imperial Oil on St. Clair River near Sarnia, Ont. . . . ¶A.P.I. recommends new system of nomenclature to cover heavy-duty lubricating oils. . . .

Plenty of Oil

Consumers need not worry about quantity or quality of gasoline or fuel oil under present military program

THE American public need have no fear of a shortage of gasoline or fuel oil as a result of the defense program or a continuation of military activity on the scale of the Korean War.

This assurance is based on a careful analysis of the Government's program, forecasts of civilian requirements for all petroleum products, and the oil industry's ability to meet the demands.

The only petroleum product now in short supply is military-grade aviation gasoline. Plans have now been perfected to remedy this, and the remedy will not reduce the quantity of civilian motor gasoline on the market. It is possible that the quality of some premium brands of high-octane motor fuel will be impaired slightly, but this will not be noticeable to the average motorist.

Home-heating oil, diesel-engine fuel, kerosine, and lubricating oil will remain in ample supply and will suffer no immediate reduction in quality. So-called residual fuel oil, the heavy grade used by industries for making steam and for bunkering ships, may be somewhat tight on the East Coast next winter, but this situation is not considered to be critical.

Military demand—The Korean War made no noticeable drain on oil supplies and caused no supply difficulties except the scramble in many refineries to step up production of aviation gasoline. Neither would there be any shortages should fighting continue on about the same scale for a long time.

The Government's defense program is now fairly well outlined, and authoritative sources in Washington estimate that under the present program the armed forces will not take more than 4 or 5 per cent of the total supply of petroleum products in this country. Increased demands of this magnitude can be supplied by the oil industry with little or no difficulty.

It will be some months before the full effects of the military program are felt by the petroleum industry. For instance, it will take considerable time to develop air strength to the programed level, and the maximum demand for aviation gasoline, accordingly, is rather far in the future.

An all-out war would, of course, alter the entire picture, and some degree of civilian rationing of gasoline and heating oil would be necessary. But this speculation involves so many combinations of circumstances and possibilities that specific forecasting is futile.

This article was prepared to help oil men answer questions from their customers and friends outside of the oil industry who may ask about the prospects for shortages of gasoline and fuel oil because of military demands. It is based on research and interviews with competent authorities in the industry and the Government by staff members of The Oil and Gas Journal in Washington, New York, and Tulsa.

Civilian requirements.—Consumption of petroleum products in the United States has been going up at a rather steady rate for several years, and the oil industry is accustomed to keeping ahead of demand. A year or so ago it was generally estimated that 1950 demand would be about 6 per cent over 1949. Current data indicate a gain of about 9.5 per cent, and the increase is being met without difficulty.

The latest forecast, made last week by the Independent Petroleum Association of America (see accompanying table), is that during the next 12 months total demand in the United States, including exports, will be 5.7 per cent greater than consumption during the past 12 months. This estimate takes into account a continuance of the present military program and a high level of industrial activity based on defense orders.

Thus the indicated increase in total demand, civilian and military, is not out of line with annual increases which the oil industry has met in the past. The I.P.A.A. forecast was for an increase of 7.7 per cent over a year ago during the next 6 months, but only 3.7 per cent higher during the second and third quarters of 1951. Some in the industry feel that this latter estimate is a bit on the low side, but many things could happen to change the picture by next summer.

Supply.—There is plenty of crude oil in sight to meet these expected demands. Allowing for a healthy increase in stocks, total demand next year is expected to average about 7,000,000 bbl. per day. During recent weeks the new supplies available in this country have averaged about 7,200,000 bbl. per day. Thus there is ample margin for further expansion.

The supply comes from three sources: Domestic crude production, averaging around 5,900,000 bbl. daily in September; natural gasoline, condensate, and other natural-gas liquids, averaging around 480,000 bbl. daily; and imports of crude and products, averaging about 850,000 bbl. daily.

Last summer it was estimated by the Interstate Oil Compact Commission that domestic crude production could be increased by more than 1,000,000 bbl. per day without injury to the fields. Since then production has increased somewhat, but also new fields have been discovered, so it is probable that a reserve production capacity of almost that magnitude exists now. Not all of this could be brought into production quickly, however, for additional pipe lines would be needed in some areas.

Imports could be expanded very considerably if needed, barring a war which shut off important sources or closed the seas to merchant shipping. The fleet of tank ships available to this country is much larger than at the beginning of World War II, and is believed to be adequate for anything short of a "seven ocean" war.

Reserves.—To increase crude production, and even to maintain it for any length of time, it is necessary to continue an extensive drilling program. This year the oil industry plans on drilling close to 43,000 wells in the United States. At least that many will have to be drilled in 1951 and succeeding years to meet the country's demands for oil.

At present the country's proven underground reserves of crude oil are at the highest level in history and adequate to sustain the present or a higher rate of production. The industry is confident of its ability to maintain a comfortable margin of reserves provided it can keep its skilled manpower and can obtain sufficient supplies of steel.

Refining.—United States refineries are currently processing about 6,000,000 bbl. of crude oil daily. This compares with 5,427,000 bbl. a year ago. It is believed that the current rate could be increased perhaps as much as 8 per cent within a relatively short time.

A majority of the nation's refineries have been very largely rebuilt during the past 10 years and the refining industry as a whole is modern and efficient. Many refinery construction projects are under way at present, and except for some additional specialized equipment for aviation gaso-

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line, the industry is able to meet all demands for petroleum products which may arise during the coming year or two. However, if demand continues to rise 4 or 5 per cent annually, additional refinery capacity will have to be constructed.

Stocks.—Inventories of crude and all petroleum products except residual fuel oil are at levels which the industry considers adequate for all contingencies, but plans are being made to increase the volume in storage somewhat during the fall as an added margin of safety. Little trouble is anticipated in doing this, since production currently is higher than consumption.

Available statistics on stocks cover only the bulk storage at refineries and terminals, and do not include inventories of jobbers, retailers, and consumers. If these secondary storage facilities are kept reasonably well filled at all times there should be few or no disruptions in consumption during the winter. However, it is possible for a spell of bad weather to exhaust local stocks in a community even though there are adequate supplies a few hundred miles away.

Gasoline.—It is the unanimous opinion of Government and industry that there will be plenty of gasoline for all uses, short of all-out war. Even then, some feel, gasoline rationing, if ordered, will be more for the purpose of saving tires than curtailing gasoline consumption.

There is some difference of opinion about the quality of motor gasoline. This is because increased production of aviation gasoline will drain away a considerable portion of gasoline ingredients which have high antiknock qualities. The most important of these is alkylate, a complex petroleum chemical made by intricate refining processes. Alkylate came into use during the last war for military aviation gasoline.

After the war much of the alkylation equipment was converted to other uses. More recently most of it has been put back into use but the alkylate has been used in motor gasoline. This is the chief reason why the antiknock ratings of most gasolines on the market have been increasing so fast recently. The average rating of all gasoline marketed in the United States today is about 86 octane number, with some premium brands rating around 90 octane.

Diversion of alkylate and other premium "cuts" of refineries into aviation gasoline might cause a lowering of the average octane rating of motor gasoline. Some say this will not be enough to be noticed. Others say the reduction may be about 2 octane numbers, which would put the average back to where it was last spring and would not affect the great majority of cars. To some extent a loss of alkylate could be offset by greater use of tetraethyl lead to prevent knocking in high-compression engines.

Distillates.—Distillates include home heating oils and diesel fuel. The use of both has expanded tremendously since the war. However, capacity to produce distillate has kept pace, and no shortage is anticipated. This does not guarantee that some community may not be caught short this winter by a combination of severe cold and a local transportation tieup, but the over-all outlook is good.

Stocks east of California are only about 4,400,000 bbl. less than at this time last year, but it is believed that consumers and secondary distributors are better supplied than last fall so there will not be an early drain on primary suppliers. The weather is the biggest factor in consumption of distillates, but refiners are figuring on being able to supply around 20 to 25 per cent more heating oil than last year if required.

Some impairment in quality of both heating and diesel oils is threatened by recent Government proposals. The Navy is considering changing its specification for diesel fuel to accept only straightrun products, the highest quality, although heretofore it has been taking a blend of straightrun and cracked products. If this is done, and if the Navy increases its consumption of diesel fuel, it will mean that civilian users of diesel fuel and home-heating oil will have to use more cracked products. This will cut down the efficiency somewhat and may cause some smoke in domestic burners of older types.

Extensive use of jet airplanes would cut rather deeply into the supply of diesel and heating oils, for jet fuel is a distillate somewhat like kerosine. At present, however, the total consumption of jet fuel is so small as to be virtually negligible in the over-all supply picture.

Residual fuel.—The only dark spot in the situation is residual fuel oil on the East Coast. This does not affect the consuming public directly, since this heavy oil is used primarily by industries and for very large heating installations. A year or so ago a sharp reduction in price plus strikes in the coal mines caused an upsurge in consumption. Since then supply has barely kept ahead of demand, and stocks at present are very low.

During the 12-month period ended July 31 almost 20,000,000 bbl. were shipped by tanker from California, but increased shipping and industrial activity on the West Coast is expected to consume about all the resid that California will produce. Large quantities are regularly imported to the East Coast from Venezuela, and this could be augmented somewhat.

Residual fuel oil is what is left after other products have been refined from crude oil, and because it is low in price refiners normally use every possible method for cracking or otherwise converting it into the more valuable gasoline or distillate.

However, a great many industrial users are equipped to burn either coal or heavy oil, and they may be expected to shift back to coal if the supply of resid gets very short or if the price rises appreciably.

U. S. PETROLEUM SUPPLY AND DEMAND FORECAST*—1950 AND FIRST THREE QUARTERS 1951

(Thousands of barrels daily)

	Estimate	Forecast				
	3rd Q. 1950	4th Q. 1950	Year 1950	1st Q. 1951	2nd Q. 1951	3rd Q. 1951
Total demand:						
Gasoline	3,051	2,791	2,786	3,518	3,099	3,212
Kerosine	237	415	323	469	231	248
Distillate	835	1,292	1,100	1,613	878	883
Residual	1,445	1,618	1,539	1,738	1,437	1,437
Other	1,078	941	955	886	988	1,088
Total	6,646	7,057	6,703	7,224	6,633	6,868
Exports (included above):						
Gasoline	73	64	67	58	69	67
Kerosine	5	5	5	5	4	5
Distillate	30	28	32	33	28	28
Residual	45	43	44	38	37	37
Other products	51	50	51	48	51	49
Crude	94	80	86	72	70	70
Total exports	298	270	285	254	259	256
Domestic demand	6,348	6,787	6,418	6,970	6,374	6,612
Total stock change	+277	—54	—65	—203	+303	+206
Total new supply required	6,923	7,003	6,638	7,021	6,936	7,074
Closing stocks (million barrels):						
Gasoline	105.0	114.0	114.0	138.0	120.0	107.0
Kerosine	28.5	22.5	22.5	13.5	22.0	29.0
Distillate	78.0	72.0	72.0	39.0	59.0	83.0
Residual	43.0	40.0	40.0	36.0	45.0	53.0
Other products and natural	88.0	86.0	86.0	87.0	89.0	87.0
Crude	242.0	245.0	245.0	247.7	253.8	250.0
Total stocks	584.5	579.5	579.5	561.2	588.8	609.0

*Prepared by the Economics Committee of the Independent Petroleum Association of America, October 2, 1950.

New England Gas

'Selfish interests' attacked by FPC in rejecting plans of Algonquin and Northeastern; new proposals invited

WASHINGTON.—Two proposals for the construction of natural-gas pipe lines to serve the New England market were rejected by the Federal Power Commission last week with the acid comment that the applicants, Northeastern Gas Transmission Co. and Algonquin Gas Transmission Co., "have placed their own selfish interests, and the interests of those with whom they are associated, above the best interests of the public."

The commission, however, left the door open to new proposals which will prove more acceptable and expressed willingness to reopen the record to receive additional evidence if necessary.

The basis of the commission's strictures was the selection of markets by the two applicants, neither of which presented a plan to provide comprehensive service to the entire New England area. Northeastern's proposal, it said, would leave more than 30 per cent of the market without service, while Algonquin's plan would deny service to more than 35 per cent of the area. At the same time, issuance of a certificate to either would render the other applicant's project infeasible.

Pointing to the "extensive and needless" duplication and overlapping of facilities in the projects as proposed, the FPC noted that the two projects would cost in excess of $60,000,000, whereas adequate service by properly designed lines could be provided at a cost of less than $50,000,000.

"It is clear from this record that to issue certificates to both applicants as applied for would place an unjust and unnecessary financial burden upon the gas consumers in New England, with no assurance that service as proposed by both would fully meet this public need," the commission said.

The commission's announcement indicated it will not approve of the carving up of the New England market, which it is estimated will require 406,446 M.c.f. of gas daily by the fifth year, with an average annual requirement of 89,633,164 M.c.f., and expressed confidence that a proposal could be drafted which would provide service to the entire area.

One dissent. — Dissenting from the majority's decision, Commissioner Thomas C. Buchanan declared that New England "is entitled to natural gas at the earliest possible date" and if the contending applicants have not been able to get together to work out some cooperative plan to that end the commission should "cut the Gordian knot" and take action even though the result may not achieve the ideal.

Buchanan asserted that the commission should approve pending applications of Tennessee Gas Transmission Co., New York State Natural Gas Corp., Niagara Mohawk Power Corp., Transcontinental Gas Pipe Line Corp., and Northeastern Gas Transmission Co., and dismiss the Algonquin application, which, he said, would make possible a gas supply for a part of New England by July 1951, with the possibility that all of the area would begin to receive gas before the end of next year.

"The trouble in New England," Buchanan said, "has been the struggle for management and control of the New England servicing company. In my opinion, the public convenience and necessity now requires the termination of that struggle in the public interest by commission action based on the record."

In rejecting the applications the commission has so far defined no working outline to guide the transmission companies. Both Algonquin and Northeastern have expressed willingness to come to some feasible arrangement by which the deadlock can be broken.

Dana M. Swan, president of Algonquin, has stated that his company is ready to take any of the three following courses:

Two-system plan.—First, it will construct facilities to serve a part of New England, consisting of Boston, Cambridge, Worcester, southern Massachusetts, Rhode Island, and Connecticut. This project supports the two-system plan recently worked out by the commission's staff which has been assigned to solve the knotty stalemate. It would also give New England the advantages of a multiple and competitive gas supply.

The second plan is to provide under the commission's auspices a single New England distributing company which would buy natural gas from the national trunk-line companies. These companies have already proposed to sell natural gas to Algonquin and Northeastern. This single company would properly have an equal number of directors elected by the Algonquin-Texas Eastern group and the Tennessee Gas-Northeastern group.

Finally Algonquin offers to provide natural gas to the entire New England market, meeting all the demands proposed to be served by either company. This would involve a substantial expansion in Algonquin facilities.

Applied early. — In January Algonquin asked FPC to authorize a $27,549,100 natural-gas pipe-line system which would have an initial delivery capacity of approximately 250,000 M.c.f. daily, and which would supply service to distributing companies serving communities in Connecticut, Massachusetts, Rhode Island, and New Hampshire. At that time Algonquin said that whenever it proved economically feasible to do so, it would apply for authorization to extend the service to Vermont and Maine.

The project would have included a main 276-mile line extending from a point of connection with Texas Eastern Transmission Corp.'s facilities near Lambertville, N. J., to a point near Boston. The firm entered into an arrangement with Texas Eastern for the latter to undertake to supply the natural-gas requirements. In addition to the main line, Algonquin planned to build about 492 miles of laterals, and a compressor station near Middletown, Conn. Initial delivery of the system could be increased by at least 100,000 M.c.f. daily by addition of extra units at the Middletown station, the company said.

Northeastern's proposal.—At the time Algonquin made its initial bid before FPC, Northeastern's plan was already pending. Northeastern sought to build a 511-mile pipe-line system for transportation and sale of gas at wholesale in all the New England states. It would have obtained its gas supplies from Transcontinental Gas Pipe Line Corp. and Tennessee Gas Transmission Co. *(The Oil and Gas Journal, February 2, 1950, page 91)*, and capacity would have been 285,000 M.c.f. daily.

Northeastern proposed to receive gas from Transcontinental at a connection on the New York-Connecticut boundary near Greenwich, Conn., and from Tennessee Gas at the New York - Massachusetts boundary near Pittsfield, Mass.

Algonquin, in a later motion, told FPC that Northeastern's proposed facilities comprised a project which was in competition with and directly opposed to the Algonquin plan *(The Oil and Gas Journal, May 25, 1950, page 175)* and pointed out that certain gas-distributing companies had signed gas-purchase contracts with Algonquin or Northeastern only, and a large number of distributing companies had signed letters of intent with both companies to enter into contracts for the purchase of gas. Algonquin contended that a full and complete record of the New England area's natural-gas requirements could not be made without the participation and supporting evidence of the customers proposed to be served by it, as well as those proposed to be served by Northeastern.

XUM

A.I.M.E.

Its petroleum branch hears about oil for an Asian war and politics in the gas business, plus technical topics

Joseph A. Kornfeld

NEW ORLEANS.—The lack of oil in eastern Asia may prevent Russia from conducting a major mechanized war in that area, L. S. Wescoat, president of Pure Oil Co., told the meeting of the petroleum branch of the American Institute of Mining and Metallurgical Engineers here October 4-6.

"The large-scale action of World War III, if it comes, will not be fought in the Far East," he said. "It will be fought closer to existing petroleum supplies." He added the assumption that American sea and air power can keep the communists from repeating the success of Japan in getting control of the East Indies where there is substantial petroleum production.

"Before World War II," Wescoat recalled, "Russia was importing oil from California to supply her needs in that area. Russia had large amounts of oil, but they were 4,000 miles from Siberian ports." He said the total yearly oil production of the mainland of Eastern Asia is only 10,646,000 bbl., or less than 2 days of production in the United States.

Wescoat's address was only one highlight of the 3-day meeting which drew more than 900 oil men and included 36 technical papers and symposiums on well logging, core analysis, phase behavior, reservoir permeability, gas technology, and drilling.

Gas obstacle.—A big expansion in markets awaits the natural-gas industry if only the federal Government will clear the road, it was declared by James E. Pew, manager of the natural-gas department of Sun Oil Co.

Pew pointed out that more than twice as much natural gas has been discovered as has been produced each year for the last 25 years, and said that during the last 25 years, proven natural-gas reserves have increased from 25 trillion to 180 trillion cubic feet, while the marketed production during this period was 64.5 trillion cubic feet.

"The unpredictable element in the outlook ahead," he warned, is the Federal Power Commission which "shows a disposition to extend its jurisdiction over the industry's activities far beyond the limits set by the Natural Gas act."

"For example," he said, "if it maintains its cost-less-depreciation theory of rate fixing, it will be faced with the questionable logic of fixing different sales prices on gas sold by different producers to a single pipeline company at a single point of delivery."

"There also remains the problem of whether or not the FPC can prevent the cancellation by a producer of a sales contract with a pipe-line company under the usual clause granting such right of cancellation in the event of FPC regulation," he said.

"As far as the future of natural gas is concerned, this much is apparent: On one hand we have a vast reserve of natural gas stored underground by nature. On the other hand is a vast potential demand for this valuable source of energy. Between them stands the FPC and other governmental agencies."

A.I.M.E. OFFICERS.—Newly elected officers of the petroleum branch of the American Institute of Mining and Metallurgical Engineers, who will serve during 1951. Front row, left to right: John E. Sherborne, Union Oil Co. of California, Wilmington, Calif., outgoing chairman; Lincoln F. Elkins, Sohio Petroleum Co., Oklahoma City, vice chairman; and Richard W. French, Sohio Petroleum Co., Cleveland, chairman. Back row, left to right: Paul Andrews, Signal Oil & Gas Co., Los Angeles, outgoing vice chairman; Paul R. Turnbull, La Gloria Corp., Corpus Christi, vice chairman; and Thomas C. Frick, Atlantic Refining Co., Midland, Tex., named to the executive committee. Not shown is John S. Bell, Humble Oil & Refining Co., Los Angeles, executive-committee member.

Soaring L.P.G. Markets

Liquefied petroleum gas, already close to a billion-dollar market, is serving only 18 per cent of its potential market at present and current sales are only 43 per cent of what probably will be sold in 1955, the A.I.M.E. was told by H. R. Thomas and W. R. Thorne of the L.P.G. department of Stanolind Oil & Gas Co., Tulsa.

This forecast was based only on use of L.P.G. as domestic and commercial fuel in a limited category of internal-combustion engines, without considering expansion in chemicals, synthetic rubber, gas plants, and other industrial uses.

Domestic and commercial uses, which last year took 1,627,550,000 gal., now have a potential of 5,700,000,000 gal., the speakers said. By 1950 they forecast this market would purchase 2,700,000,000 gal. because of the movement of population to suburban areas and the trend toward better farm living standards.

Only 77,981,000 gal. of L.P.G. was used in internal-combustion engines in 1949, they reported, but predicted that by 1955 farm tractors will require 1,000,000,000 gal., city buses 100,000,000 gal., and irrigation pumps 100,000,000 gal. This takes no account of use by the oil industry, in intercity trucks and buses, nor other engines.

"Approximately 60,000 farm tractors were operating on L.P.G. at the beginning of last year and about 20,000 units were converted during 1949," they reported. "It is estimated approximately 50,000 farm tractors will be converted during 1950. Some authorities believe that more than 100,000 units will convert in 1951. Of the 3,375,000 farm tractors in the United States a potential of 2.8 billion gallons exists in the 30 states where a differential of 4 cents per gallon or more between the price of L.P.G. and gasoline is indicated."

Water-Flood Results

Results of a pilot water flood in the Hunton limestone reservoir in Graber pool, Kansas, in operation since January 1947, have proved successful and operators plan further expansion of the project, the A.I.M.E. was told by M. H. Dubrow, W. E. Landrum, and H. L. Temple, engineers with Continental Oil Co., Ponca City. They reported that the economic benefits have been profitable to warrant consideration of water flooding as a means of increasing oil recovery from essentially depleted solution-gas-drive limestone or dolomite reservoirs.

The economic success of the project was attributed in part to the use of old wells for water injection, the fact that expensive treating and injection facilities were not required, and an average cost of only $6,000 per well

in converting the old wells to water injection.

Continental operates 11 injection wells in the project, serving a flood area of approximately 600 acres. Currently, water injection rates are 2,780 bbl. daily. No surface pressure is required to inject water into any of the wells.

Factors to be considered in determining the susceptibility of a limestone reservoir to increased oil recovery by water-flooding were given as:

1. An expensive development program to obtain water injection and producing wells should be avoided.

2. The injection of water into wells which have produced large volumes of formation water should be avoided because of the probably low residual oil saturation in those permeable streaks.

3. Tests should be run to determine if most of the permeable zones in the injection well are in communication with permeable zones in adjacent producing wells.

4. It is believed that water injection into a limestone or dolomite having fractures will invade only a small portion of the total pore space; however, it is possible that the displacement of residual oil from only the fractures may still yield sufficient oil recovery to justify water flooding.

Core Analysis Methods

New techniques for measurement of interstitial water saturation in cores of reservoir rock were revealed in the A.I.M.E. symposium on core analysis and flow research.

Centrifuge method. — R. L. Slobod, Atlantic Refining Co., Dallas, stated that the centrifuge method is a reliable one and should supersede the use of the disk method for capillary pressure work in general. Advantages cited for the centrifuge method were reliable reproducibility of results, high degree of precision, rapidity of measurement, simplicity of operation and use of commercially standard equipment.

L.P.G. STORAGE PANEL.—Members of the panel discussion on L.P.G. storage held during the gas technology symposium of the petroleum branch, A.I.M.E. Left to right: William M. Justice, technical adviser, La Gloria Corp., Corpus Christi; Charles B. Johnson, Jr., chief engineer, The Chicago Corp., Corpus Christi; K. C. Howard, proration and reservoir engineer, Richardson & Bass, Fort Worth; and George Southworth, L.P.G. distribution manager, Warren Petroleum Corp., Tulsa.

Slobod noted that with average cores of appreciable permeability, the time to reach equilibrium is in the order of about 1 hour. Extremely tight cores, he said, may be brought to equilibrium within less than 8 hours. These favorable conditions of laboratory measurement can be contrasted to the relatively lengthy time interval required by the disk method where days or even weeks may be required.

Dr. Eugene R. Brownscombe, associate director of production research, Atlantic Refining Co., Dallas, said that the centrifuge method is foolproof. He cited the limitations of the disk method wherein it has been common experience to lose an appreciable percentage of the runs because of disk failures and other inherent shortcomings.

Applications of the centrifuge method in core analysis are not completely exploited. In addition to its value in measurement of interstitial water, it has been found useful in measurement of residual oil saturation. Another use of this method is to prepare cores with proper saturates for subsequent use in laboratory fluid-flow studies.

Evaporation method. — E. S. Messer, Continental Oil Co., Ponca City, explained another new method which consists of evaporating the fluid from a saturated core to an energy equilibrium level that represents the core containing only the irreducible water. Advantages of this method were discussed by C. G. Dodd, physical chemist, Bureau of Mines, Bartlesville, who believed that the new evaporation method has important advantages over other procedures insofar as it permits core chips to be used as samples and employs nonaqueous test liquids which do not cause swelling of clay minerals and which ensure a zero contact angle against the solid surfaces of core samples which may retain oily films even after repeated solvent extraction.

FLOW RESEARCH SYMPOSIUM.—Principal speakers on the symposium covering core analysis and flow research which opened the fall meeting of the petroleum branch, A.I.M.E., in New Orleans October 4. Left to right: Harry W. Brown, Humble Oil & Refining Co., Houston; E. S. Messer, Continental Oil Co., Ponca City, Okla.; R. L. Slobod, Atlantic Refining Co., Dallas; and C. R. Holmgren, Stanolind Oil & Gas Co., Tulsa.

XUM

Drilling Contractors

With perhaps 45,000 wells to be drilled, they discuss the steel supply, personnel training, and rising costs

Henry D. Ralph

DETAILS of drilling practices were mingled with discussions of military demands for petroleum products, cost accounting, insurance rates, and research projects at the annual meeting of the American Association of Oilwell Drilling Contractors in Tulsa October 8-10.

The unexpressed but general theme of the meeting appeared to be that of tightening belts to prepare for the greatest drilling program in history.

On this theme the outgoing association president, Warren S. Churchill, president of Arrow Drilling Co., Dallas, told the members that to meet military and domestic oil requirements it may be necessary to drill 43,400 wells with a total footage of approximately 159,000,000 ft. next year, compared with an estimated 42,200 wells and 150,000,000 ft. this year.

45,000 wells.—"The excellent position of the drilling industry permits full acceptance of its responsibilities," he said, "and with 3,200 rigs in the hands of proven and competent contractors and operators, provided critical labor and materials are made available, the industry can safely assume the responsibility for drilling 45,000 wells for a total footage of approximately 160,000,000 ft. during each of the years 1951 and 1952."

The controlling factor, said Churchill, is steel, and he gave his opinion that the situation will become worse before it gets better. However, he added that he is confident the government authorities recognize the importance of steel in maintaining oil production and before too long will set up the mechanics to allocate sufficient steel for drilling.

Military support.—Some assurance of this was given the drillers by Lt. Col. W. A. Chapman, U. S. Air Force, of the Munitions Board Petroleum Division. He said the military now knows it cannot hope to fight a war if it impairs the nation's basic economy, and that its planning is based on operations which can be conducted with the petroleum products remaining after essential civilian needs are met.

Chapman stressed the need to continue a high rate of drilling and to build up proven reserves to an even higher level than at present and provide excess producing capacity greater than at the start of World War II. During the last war, he said, only 21 per cent of American oil production actually went to direct military uses, and in another war this would not exceed one-third of production, but essential civilian uses have grown so rapidly that total output must be very much larger.

Bigger problem.—Even greater than the threatened shortage of steel, in the opinion of many of the drilling contractors, is the problem of tightening up internal operations to offset increasing costs. Discussion of this problem divided mainly into four topics:

1. Better knowledge of costs in making bids.

2. Training personnel from top management down through unskilled labor.

3. Greater emphasis on safe practices and safety training.

4. Improved techniques to prevent loss of time and equipment.

Most of the committee reports and technical papers dealt with one or another of these topics.

Costs.—A completely new edition of the association's manual of accounting practices with an accompanying costing guide was presented by the accounting committee and was received with enthusiasm by contractors who said they have followed the old manual with good results but feel the need for more up-to-date information. The committee recommended a series of measures to secure wider use of the manual, such as training courses within companies and its use in schools of petroleum engineering and accounting.

Training.—The research and education committee urged an enlargement of the association's management clinics in order to provide training for all types of workers, both in offices and in the field.

The education theme also was stressed by the insurance committee, which reported that many claims for insurance are being lost because supervisory personnel fail to make accident reports promptly and in proper form.

A. W. THOMPSON

Equipment.—Lower costs through better use of equipment was discussed by the committee on rotary-drilling methods. Among the practices suggested to keep holes straight in certain areas were multiple drill collars to keep weight on the bottom of the string, fluted collars with an outside diameter almost that of the hole, two-cone, jet-type rock bits, and oil-base mud. Cutting costs by standardization of equipment also was suggested, and it was pointed out that one manufacturer offers 33 sizes of drill collars while another make 92 different styles.

The technical papers also dealt with personnel training, safety, and lower costs by better use of equipment. In the latter category were papers on cutting maintenance costs on slush pumps, speeding drilling in some formations by the use of oil-emulsion muds, freeing stuck drill pipe by explosives, preventing failures in surface casing and dividing the responsibility for this between contractor and operator, and preventing failures in drill collars by proper make-up torque and rotary speeds and by prevention of corrosion.

Officers.—A. W. Thompson, president of Thompson-Carr, Inc., Houston, was elected president of the association. Other new officers are H. W. Davidson, Davidson Drilling Co., Odessa, vice president for West Texas and New Mexico; Harold N. McClure, McClure Drilling Co., Alma, Mich., vice president for cable tools; D. E. McMahon, Nicklos Drilling Co., Houston, vice president for Gulf Coast; C. H. Todd, R. W. Rine Drilling Co., Wichita, vice president for Central Mid-Continent; W. W. Cline, San Joaquin Drilling Co., Los Angeles, vice president for California; Will I. Lewis, Mount Vernon, vice president for Illinois, Michigan, Indiana, and Kentucky; Charles W. Glasscock, Glasscock Drilling Co., Shreveport, vice president for Cretaceous and Tertiary basins; H. A. True, Jr., Reserve Drilling Co., Casper, vice president for Rocky Mountains.

Officers reelected were Joseph V. Dunbar, Dunbar Drilling Co., Salem, Ill., vice president at large; J. J. Harrigan, Standard Drilling Co., Oklahoma City, vice president for well servicing; Louis A. Beecherl, McDaniel & Beecherl Drilling Co., Dallas, treasurer; Brad Mills, Dallas, executive vice president; J. Doyle Settle, Dallas, secretary; Marion S. Church, Dallas, general counsel.

Drillers Talk

Delegates to A.A.O.D.C. chat about business outlook, steel supplies, new methods, competitive practices

WHAT'S ahead for the drilling contractor? This question was asked of several dozen contractors attending the A.A.O.D.C. meeting by members of the Journal's editorial staff. Some of the more interesting comments are briefed as follows:

A. W. Thompson, Thompson-Carr, Inc., Houston, new president of A.A.O.D.C.: Education and training of personnel from top to bottom is one of the biggest challenges facing the drilling industry. We have excellent equipment but we need to know how to use it better. Better training will reduce accidents, conserve equipment, and save time both in the field and the office. Better knowledge of costs and how to figure them will help prevent a contractor from bidding too low and losing his shirt in this period of rising prices.

Ira Van Tuyl, owner, V-T Drilling Co., Evansville, Ind.: Drilling activity is brisk in the Illinois Basin territory and independent operators are especially busy. There is a definite trend in the area toward use of smaller rigs, with many unitized features, for two reasons: (1) much drilling work has moved toward the eastern part of the Basin, which is shallower territory, from "grass roots" to 3,500 ft. maximum; (2) individual rig loads on trucks must be lighter since different state highway departments are enforcing road-weight limits. Increased costs of labor and equipment and supplies are a live problem in the territory.

Irv Harden, partner, Peel Drilling Co., Hoisington, Kans.: It is difficult to keep trained crews at work, and good drillers have been especially hard to find and keep. Footage rates have dropped off approximately 25 cents per foot during the last 9 months in the Hoisington area, but labor costs have remained constant since last year. Anything with steel in it is getting hard to buy; casing is scarce, and Peel is operating on a "drill as you get it" basis. Tubing and rods are dwindling, with no bright prospects of getting more. No let-up is anticipated in company drilling activity unless material shortages force curtailment, as contracts are plentiful.

J. E. Jackson, president, Jackson & Gay Drilling Corp., Duncan, Okla., and Coats & Jackson Drilling Co., Inc., Lubbock, Tex.: Upward climb in drilling footage rates is long overdue. Equipment costs have maintained a steady upward spiral, and wages for production personnel have jumped 6 per cent. Drilling-crew wages are going up in the near future; all this has happened while drilling footage rates have remained constant the last 2 years. Little difficulty found so far in obtaining casing, due to a policy of giving all casing-purchasing business to one firm.

Frank Buchanan, vice president and drilling superintendent, Al Buchanan Drilling Co., San Antonio: One clear point to settle in the drilling industry is to determine where keen competition ends and unfair tactics begin to hurt the entire oil industry. Practice of making low bids that are known to be below profit margins is disturbing. Pipe is short but the firm is fortunate to have a year's supply on hand.

C. W. Alcorn, Houston, vice president, Falcon Seaboard Drilling Co., Tulsa and Houston: Some slackening of drilling in the Gulf Coast region of Texas and Louisiana is noted, with a few rigs now idle. This is attributed partly to the growing shortage of pipe and the desire of some operators to delay unnecessary drilling to conserve present supplies for emergencies that might arise later. It is felt that arrangements of some kind will be made to make adequate supplies of steel available to the oil industry.

Zack K. Brinkerhoff, Jr., coowner, Brinkerhoff Drilling Co., Casper, Wyo.: More rigs can be used in the Rocky Mountain region than are now available. Drilling in the region has picked up substantially within the past few months. Increase is normal this time of year, however, because operators usually try to get as much of their drilling done as possible before bad weather sets in. Part of increased activity is attributed to prospects of greater demand for Rocky Mountain crude following completion of the new pipe line to be laid out of the area in the near future by a group of major companies. Pipe shortage has not held up any drilling but growing steel shortage is becoming a matter of concern and may force some curtailment later.

W. W. Cline, president, San Joaquin Drilling Co., Los Angeles: Seventy per cent of rigs on West Coast are operating, with most of those out of work being old-fashioned rigs. Area is feeling pinch of pipe shortage because of reallocations by supply houses which have cut fourth-quarter supplies below original estimate. Pipe has been sent to West Texas instead of California, and there is some German pipe coming into the West Coast which is bringing a 20 per cent premium. No unfair practices with supply companies in the U. S. have been observed.

George P. Livermore, president, George P. Livermore, Inc., Lubbock, Tex.: Drilling activity in the West Texas-New Mexico region is showing some signs of slackening, but there is still plenty of drilling in prospect to keep contractors and operators reasonably busy for some time. Growing shortage of pipe is being felt in West Texas to an increasing extent, and is expected to be an important factor in the situation.

S. V. Hodges, vice president and general drilling superintendent, Big Chief Drilling Co., Oklahoma City: Concerned over prospects of pipe shortages, but no trouble has been encountered so far in keeping all rigs running. Outlook for drilling business would be bright if adequate supplies of steel could be made available. No major loss of manpower to armed services noted so far.

J. E. Brantly, president, and Ralph W. Marshall, executive vice president, Drilling & Exploration Co., Abilene, Tex.: If the industry refrains from stockpiling, the steel industry will be able to serve drilling operations, and if everyone buys pipe as is needed, there should be no shortage. No considerable inconvenience has been encountered in getting pipe as yet, except in isolated cases. Improved techniques have provided greater portability, and details of operations have been improved, but there have been no real changes in basic practices. Wages were increased 10 per cent in Texas and New Mexico and 6 per cent in California. A foot of hole costs less now than any time during the past 35 years.

James Adkins, president, Adkins Drilling Co., Great Bend, Kans.: Prospects for the drilling business in western Kansas appear to be good, with plenty of work ahead. Some difficulty has been encountered in getting pipe, both by contractors and operators. The pinch has been felt by the armed forces taking men from drilling crews.

Don E. McMahon, vice president, Nichlos Drilling Co., Houston: No pipe shortages have been experienced as yet, but there are signs of the beginning of a labor shortage, as men are called from the drilling crews into the armed forces. Large operators are reported making special efforts to insure that they have supplies of pipe ahead. Wages recently were raised 6 to 8 per cent.

Arthur Olson, vice president, Olson Drilling Co., Tulsa: Delays have been noted in getting deliveries of drill pipe, although it can generally be obtained. Casing orders are not being taken. Wages were raised on October 1. Manpower shortage has not yet affected company operations.

XUM

Avgas Directive

PAD places supply problem in refiners' laps and urges voluntary action to step up output by 25,000 bbl. daily

Bertram F. Linz

WASHINGTON. — The Petroleum Administration for Defense tossed the aviation-gasoline problem into the lap of the refiners last week, with an appeal for voluntary action to up output by an average of 25,000 bbl. daily for the current quarter.

Petroleum Administrator Oscar L. Chapman promised to use his best efforts to see than any extraordinary costs incurred would be taken into account in the prices to be paid for avgas by the Government, but PAD officials said that definite figures could not be assembled until they knew just what the "quickie" avgas program would involve.

The call to refiners was the first official action of the new petroleum agency which will administer the provisions of the Defense Production Act as they apply to oil and natural gas. An avgas unit has been set up, with A. P. Frame, Cities Service Oil Co. vice president in charge of manufacturing and research, as director, supported by Thomas L. Apjohn, of Socony-Vacuum Oil Co., Inc., as assistant director, and Donald P. Heath, also of Socony-Vacuum. Both Frame and Apjohn served with the Petroleum Administration for War, the former as director of its refining division and the latter as aviation-gasoline specialist.

All-out drive. — Explaining that the effort was designed to increase the output of avgas immediately, Frame said PAD is asking the industry to make an all-out drive on the promise of the administration that their economic affairs will be taken care of as fast as possible.

"We are not talking about orders or directives," Frame said, "but are passing it to the industry to do all it can to help as they have done in the past."

PAD, Frame added, will go as far as possible without issuing orders, and how far that will be depends upon industry cooperation.

At a news conference attended by Hugh A. Stewart, acting deputy administrator, J. R. Parten, consultant, and Frame, it was estimated that the extraordinary costs which will be incurred during the current quarter will run in the neighborhood of $4,000,000, partly for transportation charges to tank-car alkylate from eastern points to the West Coast avgas refiners and partly for the expense of modifying refineries to produce more high-octane components.

The 25,000-bbl. boost in daily output now sought, Frame said, is the first of several such increases which will be necessary. But, he explained, this will involve at most only a fractional reduction in the octane value of civilian gasoline and probably no reduction whatever in availability, since new refinery facilities are rapidly being completed in an expansion program which will run over the next 2 years. But next year, octane value may have to be cut to about the level of summer 1949.

There was nothing of a directive nature in PAD's call for more avgas. Refiners were merely asked to report immediately what quantities of gasoline and avgas components could be manufactured in excess of present commitments for the remainder of 1950 through use of emergency measures.

"As a producer of avgas or the components thereof, will you please advise as soon as possible what quantities of avgas of 100-130 grade or higher, or of components, you are willing to offer to military procurement agency, or to another refiner, in excess of your present commitments for the balance of 1950," Stewart wired producers. "In your advice state the additional quantities in increments of increasing abnormal costs and state magnitude of the abnormal costs above your present highest contract price for avgas or components.

Transfers urged.—"Initially consider only increased production from your own facilities and from raw materials or components that you can and will obtain from other refiners, and I strongly urge that you endeavor to develop plans for such interrefinery transfers on your own initiative immediately. Such steps as catalytic retreating or reforming for the production of higher quality base stocks, alkylation of selected polymer, increased production of butylenes, are obvious steps that the industry might take.

"Since the demand for butylenes for synthetic rubber is also critical, do not show in your increased avgas-production figures any additional production from butylenes you have already committed for butadiene manufacture."

Cost protection. — Assurance that every effort would be made to protect producers against being stuck with the additional costs was given by Chapman in a memorandum to Stewart.

"When the Petroleum Administration for Defense has been fully established and perfected, appropriate governmental arrangements and proper procedures must be developed for the certification of extraordinary expenses to governmental procurement agencies so that such expenses will be taken into account in the prices to be paid for military aviation gasoline and butylenes for synthetic rubber," Chapman said.

"However, the immediate needs of the armed forces for aviation gasolines, coupled with the needs of the synthetic-rubber program for butylenes (one of the semirefined products from which aviation gasoline is manufactured), admit of no delay. Any time lost now can only mean a much more critical shortage later.

"Accordingly, you are authorized to support your specific requests to individual units within the petroleum industry for additional production of military aviation gasoline (or any of its components) and for butylenes for synthetic rubber with my assurance as Petroleum Administrator that all properly supported extraordinary costs will be accorded fair economic evaluation by the Petroleum Administration for Defense and that I will use my best efforts to see that all such costs are given due recognition by procurement and other agencies of the Government in accordance with appropriate statutory authority."

OGD action.—The first steps toward increasing avgas production were taken a month ago, when the Oil and Gas Division asked refiners to discontinue using alkylate in motor gasoline, and Frame said the response had been highly satisfactory. Some refiners who had no other outlet for their alkylate continued to use it in gasoline, and that was acceptable to the department, he said, but as soon as a reimbursement program can be worked out it will be possible to transfer such alkylate to producers who can make better use of it.

The tank-car supply has been shown by a recent survey to be adequate for normal traffic, it was said, but pressure-car situation is not too satisfactory.

Airlines Hit

Commercial aviation fuel to be changed

George Weber

NEW YORK. — Specifications for commercial aviation gasoline may be revised immediately to make more components available for the military grade, still in short supply. A recommendation from the Petroleum Administration for Defense calls for airlines to accept a fuel with higher tetraethyl lead content and higher distillation range. This will allow the direct diversion of alkylate from commercial 100-130 grade aviation gasoline, to military 115-145 grade, and will serve immediately to boost production of the latter.

This immediate means for augmenting military avgas production is

necessary to close the gap still existing between military requirements for the remainder of the year and commitments to date. It will allow the industry more time to effect the segregation and allocation of important feed stocks to alkylation plants, in bringing them up to capacity production.

The changes in 100-130 specifications call for raising the limit of tetraethyl lead content from 3.0 to 4.6 cc. per gallon. This additional lead will serve to maintain the octane rating of the fuel with lower-octane hydrocarbon components which can then be switched to military grade. The principal changes in the distillation range specifications will be increases from 158° F. to 167° F. in the 10 per cent point, from 257° F. to 275° F. in the 90 per cent point maximum, and from 338° F. to 345° F. in the maximum end point. Allowable lead content and volatility are the only two characteristics to be changed.

Airlines protest.—Airlines spokesmen were loud in their protests against the proposed changes. They stated that the new fuel would increase the possibilities of potential accidents, reduce airlift capacity, and increase consumption and maintenance requirements. To the safety argument, the Government replied that the military is using 4.6 cc. per gallon in its 115-145 grade with a good safety record. Experts are known to disagree on the extent to which the new quality would affect mileage and maintenance.

To his statement that the new commercial fuel would increase airlines' fuel bills by 15 per cent and maintenance costs by 20 per cent, Milton W. Arnold, vice president of the Air Transport Association, added the surprising recommendation that much greater expansion of avgas production would be permitted if the octane rating of motor fuel was reduced from the current rating of 90 octane for premium and 80 octane for regular to 75 and 70 octane numbers respectively.

Despite the opposition of airlines, the new specifications are expected to be adopted. Actually, the jump in TEL content will not amount to 1.6 cc. per gallon, as purchasers have been waiving the 3 cc. limit in many cases in the past. Currently, approximately 25 per cent of 100-130 aviation fuel going to airlines is estimated to contain about 4 cc. and the over-all average of commercial avgas is about 3.4 cc.

NATIONAL AFFAIRS

The PAD

Petroleum Administration for Defense is now functioning, with its powers and limitations set by official orders

Bertram F. Linz

WASHINGTON. — The Petroleum Administration for Defense was formally established October 3 by Petroleum Administrator Oscar L. Chapman, with OGD Director Hugh A. Stewart as acting head.

Bruce K. Brown, president of Pan-Am Southern Corp. and chairman of the military petroleum advisory board, is expected to take over the leadership of the agency as Deputy Administrator within a few days, and already more than 30 experts recruited from the industry have arrived in Washington.

PAD will administer the defense responsibilities with respect to oil and gas delegated to the Secretary of the Interior by President Truman in his executive order of September 9. It will be entirely separate and apart from the Minerals and Energy Administration created late last month by Chapman to handle similar responsibilities in coal, electric power, and minerals, and is modeled along the lines of the Petroleum Administration for War which controlled the industry from May 28, 1941, when the office of coordinator was set up, to May 8, 1946.

Organization. — Provision was made in Chapman's order for a general counsel, administrative officer, finance counsellor, manpower counsellor, materials director, director of public information, program director, directors for the various operating divisions that may be set up, assistant deputy administrators, and special assistants to the deputy administrator.

In setting up the line of authority, Chapman ordered that "the deputy administrator shall report and be responsible only to the administrator," setting at rest the last industry fears that the oil agency would in some way be tied in with other agencies of the department, and in the same paragraph emphasized that "the Petroleum Administration for Defense shall operate as an independent agency."

Rube Goldberg Views the News for His Latest Invention

HOW TO GET A WOMAN OUT OF A TELEPHONE BOOTH

TRUMAN (A) LEAPS JOYFULLY FROM BED AT 6A.M., CAUSING SCATTER RUG (B) TO TOPPLE CHISELING MIAMI **TELEPHONE GIRL** (C)--HIDDEN COINS (D) DROP FROM **DRESS** INTO LADLE (E), RELEASING CANADIAN SMOG (F) AND CAUSING MINISTERS **SCHUMAN, ACHESON** AND **BEVIN** (G) TO COUGH, BLOWING LID OFF NEW YORK POLICE DEPARTMENT (H)--FALLING STONES HIT FLEEING **NORTH KOREAN** (I) CAUSING HIM TO RUN FASTER AND LIFT CURTAIN (J) ON **MILTON BERLE** (K) DRESSED AS BABY--**CONGRESSIONAL CANDIDATE** (L) BENDS OVER TO KISS BABY, UPSETTING CAGE (M), DUMPING MICE (N) INTO TELEPHONE BOOTH, AND LADY (O) LEAVES HURRIEDLY.

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XUM

WATCHING WASHINGTON

Bertram F. Linz

Same Thing Again

If an oil man blows the dust off his "History of the Petroleum Administration for War" and substitutes "PAD" for "PAW" he'll have a pretty fair blueprint of the newly created Petroleum Administration for Defense.

PAD is patterned pretty much along the lines of the World War II organization, with the same independence of action and freedom from bureaucratic control and influence. Its problems, although to lesser degree, will be just about the same—the need to provide increasing quantities of aviation fuel and other products for the military, develop adequate crude supplies, increase refining facilities, secure components for synthetic rubber, protect the public against cold and a stoppage of essential transportation, and insure adequate transportation by tanker, pipe line, and railroad so that what is needed can be delivered where and when needed.

Not only will the same kind of organization have the same kind of problems, but it will have many of the same men who dealt with those problems one war back. Several former PAW officials already have been called back to service and more will be on the way in weeks to come.

Manpower Outlook

The Selective Service System is getting pretty well down toward the bottom of the barrel in the drafting of men under 26 and expects in the not distant future to have to tighten up on dependency deferments and take in veterans of the last war, now exempt, and eventually raise the draft age.

In view of these prospects, officials are advising industry to fill as many key positions as possible with men over 35 and those of younger age physically unfit for military service.

Raising the draft age above 26 is the last step Selective Service wishes to take, and it is hopeful that an armed force of 3,000,000 men can be procured and maintained by drafting only men between 19 and 26. This would involve reduction of physical and mental standards of the services, tightening of dependency deferments to cover only fathers and hardship cases, calling up veterans, and a "very strict attitude" toward occupational deferments. But even these steps, it is emphasized, will about exhaust the available manpower in that age group and any further military expansion would necessitate calling older men.

It is the theory of Selective Service that, on the whole, the induction of the younger men is a loss much easier for industry to absorb since these men have less experience and are consequently easier to replace, while to raise the age limit would mean taking men with greater skills and more extensive experience which would be a much more severe impact upon industry.

Even in the event of all-out war the top age for induction would not exceed 38 and probably would be held to 35 as long as possible, according to officials who are advising industry to plan to keep all men between 26 and 35 during the foreseeable future but develop plans to keep men over 35 indefinitely as a hedge against an extreme emergency.

Inflation or Deflation?

The administration is concerned about inflation and all the present economic portents point to continuance of the upward spiral but there are some economists who believe the chances are equally good for a downward trend within the next few months.

There are several factors on which to base a prospect of deflation. They include the increases in corporation and individual taxes now in effect, the excess-profits tax due to be imposed within a few months, construction and consumer-credit controls, and the dying out of "panic" buying. On the Government side, there is the prospect that for some time to come receipts will exceed expenditures since defense spending will not reach a substantial level before next spring.

If taxes take a sizable chunk out of consumer buying power and construction and credit controls and shortages of materials make buying more difficult, the inflationary trend might slow down.

Government officials admit the existence of antiinflation factors, but they insist there are only two effective ways of halting inflation. One is by fiat—price and wage controls—and the other the drying up of purchasing power by depression, oversupply, or taxes. Neither depression or oversupply is in sight; the Government now is using the tax device and if that fails the only course will be through controls.

Powers.—The functions assigned PAD will include:

"1. The determination of requirements of various claimant agencies for petroleum and gas.

"2. The allocation of petroleum and gas among said claimants and, under appropriate circumstances, to the public and industry in general.

"3. The establishment of programs and policies with respect to the operation of the petroleum and gas industries.

"4. The development with other appropriate governmental agencies of such arrangements relating to petroleum and gas as may be necessary with respect to industrial operations, materials, manpower, procurement, financing, loans, or other forms of assistance and the administration thereof.

"5. The discharge of such other functions, powers, and responsibilities with respect to petroleum and gas as may have been delegated to the Secretary of the Interior Pursuant to Executive Order 10161, and such other orders or arrangements relating to petroleum and gas as may hereafter be established, including the claiming on behalf of and the distribution to the petroleum and gas industries of such materials and commodities as may be required in the operation of these industries."

Limitation. — Certain limitations are imposed upon the authority of the deputy administrator, who may not "(1) without the approval of the administrator, redelegate any of the powers delegated to the deputy administrator by this order, (2) appoint industry - wide advisory committees, or (3) exercise the powers or functions respecting voluntary agreements and programs delegated to the Secretary of the Interior by section 801(b) of Executive Order 10161."

The deputy administrator, however, may establish such local or technical industry advisory committees as may be necessary, but in so doing "shall so select the representatives thereon as to give full and adequate representation to all interested segments of the petroleum and gas industries with due regard to industrial and competitive relationships of units within those industries."

With formal provision made for the organization, both Stewart and J. R. Parten who, as consultant, assisted Chapman in its planning, emphasized that PAD will operate so far as possible on a basis of voluntary action by the industry to carry out its programs. Every effort will be made to keep formal orders and directives to a minimum on the theory, proven in the last war, that one order breeds others. And both Chapman and Parten have emphasized that, as in the last war, the policy will be to release the industry from control as soon as possible and in the same independent, competitive shape as it is in now.

More Controls

Further regulation of industry being framed, but timing depends on foreign rearming and extent of fighting abroad

WASHINGTON.—With the groundwork of the defense production program laid down in the National Production Authority's orders, providing for inventory control and priorities for military contracts, additional regulations are expected to be announced shortly which will:

1. Relate the DO (defense order) priority ratings to specific materials.

2. Provide lower ratings for pipe lines, freight cars, and other facilities subsidiary to military production but essential to preparedness.

3. Extend the list of materials to which inventory control will apply.

4. Call for inventory reports to expose consumers who are holding supplies of controlled materials in excess of normal needs, to force such excess supplies on to the market.

5. Increase the rate of stockpiling, which has been lagging, possibly to three times its present rate.

Foreign rearming. — Just how fast new orders will come along and how far they will go will depend, it is presumed, on the Defense Department's final estimate of its requirements and a decision on what we are to do abroad.

Some government officials feel we should share our materials with the Atlantic Pact nations, which might necessitate reactivation of the Word War II international raw materials board, for both military and nonmilitary purposes.

The Defense Department has not yet disclosed the extent of its rearmament program, but industrialists who are keeping in touch with it predict it will be "shockingly" broad. The development of definite figures has apparently been stalled while consideration is given to the extent we should rearm other countries, in addition to those in the Atlantic Pact. The probability is that such assistance will be given to the Philippines, Indonesia, Thailand, Indo-China, and perhaps even Burma, where we would have to help set up a government since that country so far has been unable to govern itself.

Steel.—Defense officials will not discuss their probable steel needs, but do not say that suggestions that demand, direct and indirect, may reach as much as 20,000,000 tons of steel are too high. The program developed under present appropriations calls for about 7,000,000 tons for direct military production and 6,000,000 tons for freight cars, spread over a 2-year period, plus indeterminate amounts for pipe lines and other facilities.

Priorities. — Meanwhile, suggestions have been made that once the materials control machinery gets into high gear it will be necessary to concentrate all priorities and allocation powers in one super agency instead of spreading them among three or four agencies which do not always see eye to eye, as at present.

One reason why such a move might be advisable is seen in the synthetic-rubber program. There, if it was decided to provide DO ratings for materials, the priorities might run to butadiene and then to alcohol to make the butadiene but if they were to extend to molasses to make the alcohol the scene of action would shift from the NPA to the Department of Agriculture, which has been given authority over agricultural products.

Price control.—Price control, in one form or another, is seen as likely to follow immediately upon the appointment of a chairman for the Price Stabilization Board, for which President Truman is having difficulty in finding men willing to accept positions. The control probably would not be at the consumer level, which would require concurrent imposition of wage controls, but at the wholesale or manufacturing level.

Such a move in advance of the congressional elections would be politically good, meeting Republican campaign charges that the administration is dragging its feet on the problem of inflation. Also, the absence of wage controls would be appealing to organized labor, whose leaders are highly resentful of the extent to which the administration is turning to businessmen to fill key posts in the defense setup, charging it is prolabor on election day and probusiness the rest of the time. A price controller reportedly has been selected, to be appointed when the Wage Stabilization Board is set up, a job which the union organizations hoped would go to a labor man, possibly Walter Reuther.

War economy.—NPA has been slow in setting up the industry advisory committee provided for in the Defense Production Act and is expected to be cautious while officials wait to see what turn the international situation may take in the near future now that Korean military operations appear to be tapering off.

This leads to the administration's No. 1 problem—whether the country can and will support a wartime economy when it is not at war. That question has been the subject of discussion, too, at recent meetings of important trade associations. Many business leaders concur in the administration's belief that a strong military force is the best deterrent to another war, but the general public is seen as resentful of steadily increasing taxes to finance a war machine when there is no actual war.

Behind the administration's concern is the recognition that Soviet Russia undoubtedly is familiar with American psychology and, now that its experiment in Korea has failed, may lie low for a time in the hope that public apathy will force a slackening of the defense program and we again fall into the position we were in when the Reds invaded South Korea.

Taxes. — In some Capitol circles, it was said flatly that if peace returns to Korea and there are no incidents elsewhere it will be extremely difficult for Congress to enact an excess-profits tax. But work on that levy is going ahead in anticipation of the return of Congress November 27 and a proposal also has been put forth for an excess-profits tax on indivduals. Under that proposal, an individual's average annual income for the years 1946-48 would be used as a base and any increase in income over that average would be subjected to the super tax.

SINCLAIR'S HOME.—Sinclair Oil Corp. has leased more than half of this 26-story building nearing completion at Fifth Avenue and Forty-eighth Street, New York, on the site of Collegiate Reformed Church of St. Nicholas, long a mid-Manhattan landmark. It will be named the Sinclair Building and will give the company 170,000 sq. ft. of air-conditioned office space for the more than 1,000 employes of its home office. The company expects to move next spring.

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CANADA

Line Operating

Interprovincial section opened to Regina, Sask.

EDMONTON.—The first section of Interprovincial Pipe Line Co.'s 1,127-mile crude-oil pipe line from Alberta to the Great Lakes went into operation last week.

In a ceremony here, Alberta's premier, E. C. Manning, turned a valve which officially opened the 439-mile section of the line to Regina, Sask. Work is continuing on the remainder of the line to the Great Lakes terminal at Superior, Wis.

The official opening October 4 of the first section was a historic occasion for western Canada's petroleum industry. The line is the first major crude system in Canada, and its operation marks the first pipe-line movement of Alberta crude to eastern refineries.

The opening ceremony held at Inprovincial's Edmonton pump station, was attended by some 200 civic, government, and business officials from many parts of Canada and the United States. Speakers referred to the line's importance to the Canadian economy by providing low-cost transportation for one of the country's great resources.

The 20-in. Edmonton-Regina section was started last spring and completed in less than 6 months. It was considered the fastest major pipe-line construction project ever carried out *(The Oil and Gas Journal, September 28, page 55)*. Temporary pumps are being used to move Redwater field crude into the Edmonton end pending completion of the Edmonton pump station within the next few weeks.

Approximately 840,000 bbl. of crude is needed to fill the Edmonton-Regina section, and first deliveries are not expected to be made at the Regina refineries until the end of this month.

Central section.—The 336-mile, 16-in. central section extending from Regina to Gretna, Man., is virtually complete, and crude is expected to be moving through this part of the system by the end of November. The final section is the 322 miles of 18-in. in the United States. This is expected to be in operation about the end of December.

When the system is in full operation next spring, it will move 95,000 bbl. of crude out of Edmonton daily. About 70,000 bbl. will continue eastward beyond Regina, and deliveries to Superior will be about 55,000 bbl. daily by next spring. The plan of operation calls for building up crude in storage at Superior during the winter months and its movement to Ontario refineries during the summer months when Great Lakes navigation is open. Imperial Oil, Ltd., which sponsored the Interprovincial company and holds about 45 per cent interest, has constructed the world's two largest fresh-water tankers to bring the crude eastward from Superior.

One of the river crossings on Interprovincial Pipe Line Co., Ltd.'s, line which is now in partial operations. Note concrete weights.

Speakers.—At the opening ceremony at Edmonton last week, C. D. Howe, Ottawa, minister of trade and commerce of the federal government, extended the government's congratulations on the successful completion of the project. Other speakers were: J. Grant Spratt, president of the Western Canada Petroleum Association; G. L. Stewart, Toronto, Imperial president; and Dr. O. B. Hopkins, Interprovincial president. Loren F. Kahle, executive vice president of Interprovincial, was chairman of the opening.

When Alberta crude reaches Ontario refineries for the first time next spring, the oil will make its first entrance into a world market outside the limited western Canadian producing area. Ontario refineries now receive crude from the United States, from the Caribbean, and to some extent from the Persian Gulf. It has been pointed out that Alberta crude must be competitive pricewise in order to take advantage of this broader market.

SOUTHWEST

'No. 1 Enemy'

U. S. will be main foe of any future aggressor, so oil industry must be prepared, Jennings tells Texas group

Carl F. Hoot

DALLAS.—This country is certain to be regarded as the No. 1 enemy of any future aggressor, B. Brewster Jennings, president of Socony-Vacuum Oil Co., Inc., told members of the Texas Mid-Continent Oil and Gas Association at its twenty-first annual meeting here October 4-6. He asserted that the oil industry needs more than ordinary peacetime economic stimulants to be ready to meet demands of sudden and total war.

Jennings said that adequate defense plans must include coordination of industrial and military efforts, and said he doubted whether many people appreciate the tremendous load that wars place on oil, and the vital necessity that oil performs 100 per cent, regardless of the load.

General theme of the meeting was the necessity of continuing an intense exploration program for new oil in face of probable steel shortages, and for a greater output of petroleum products to meet the threatening war situation.

B. B. JENNINGS

The industry's importance in the role of supplying civilian, industrial, and military needs was pointed out, and instances cited where certain vital products are already in short supply.

He estimated that for the country as a whole, the oil and natural-gas industry this year

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would supply 50 per cent of the energy requirements, compared with 44 per cent in 1940.

More oil used.—It was also shown that except for coal and electric power used in arsenals and permanent bases in this country, and the small amounts of missile and rocket fuels now coming into use, the only fuel used by the Army, Navy, and Air Force is oil.

Referring to the aviation-gas supply, now facing a situation where programs are being considered which will reduce octane ratings of gasoline supplied to certain civilian users, Jennings said that war will greatly increase essential demands for specialized types of products, and for abnormal proportions of regular types. Specific mention was made of aviation needs, jet fuels, special lubricants, and of the residual fuels which were used in such huge quantities by the Navy and Merchant Marine during the last war.

"Spokesmen for the oil industry have said that United States' oil is in good shape to meet all demands," Jennings continued. "While this is true in general, we all know that we are right now up against it to supply the top grade aviation gasoline in the volume desired, and we know equally well that to oil a full-scale war effort will require pretty drastic rationing for civilians."

Alkylation plants.—Jennings discussed the lack of sufficient alkylation plants, which contributed to the difficulty of making present-day military grades of aviation gasoline in adequate volume. He said this was due primarily to the fact that aviation gasolines at the end of World War II required only minor percentages of alkylate, which is derived from crude oil by methods entirely separate from conventional refining procedures. By comparison, grades of aviation gasoline today require up to 80 per cent of alkylates.

He suggested the Government cooperate with the oil industry in more practicable distribution of alkylate and alkylate feedstock among oil companies.

Brig. Gen. Robert J. Smith, vice chairman of the National Security Resources Board, told Texas oil men they will be expected to continue exploration and development of oil and gas resources, but with steel in short supply. He called upon operators to direct their efforts and operations so they will contribute most to our military requirements.

GEN. SMITH

General Smith, who gave up his civilian duties as president of Pioneer Airlines for those of the NSRB, described the function of the board in the nation's security program as that of umpire and expediter, peacemaker, and prodder. He said the President has charged the agency with coordinating various government agencies which will administer the Defense Production Act, enacted last month.

General Smith emphasized the point regarding steel, which is a primary requirement in drilling operations, and plant and pipe-line expansion programs, when he said that the truth is that steel is still in critically short supply.

F. W. SHIELD

J. S. LEACH

Awards made.—Distinguished service awards were given Fred W. Shield, San Antonio independent, and J. Sayles Leach, formerly of Dallas, and now executive vice president of The Texas Co. in New York.

Officers of the association were reelected at the close of the meeting, with one new district vice president added.

Oil Show

Permian spectacle opens in Odessa October 19

ODESSA.—Between 40,000 and 60,000 visitors are expected at the first Permian Basin Oil Show here October 19-22. In addition to more than 200 industrial exhibits, the 4 days offer a variety of entertainment and will provide a gathering point for meetings of oil men from a wide area.

Included in the program are meetings of local chapters of national oil-industry associations. One of these is a meeting of the local American Petroleum Institute chapter which will feature Walace Hawkins, vice president and general counsel of Magnolia Petroleum Co., as speaker. The meeting will also include a barbecue October 19.

On October 20 there will be a combined meeting of the American Institute of Mining and Metallurgical Engineers, the American Association of Oilwell Drilling Contractors, and the West Texas Geological Society.

A meeting of the western division of the Association of Oil Well Shooting-Torpedo Companies of America also will be held October 20.

Dances, a musical revue, fireworks displays, and a barbecue will also be held in connection with the equipment exhibition.

Aerial view of Ector County Park in Odessa, Tex., site of the Permian Basin Oil Show. The structures marked A, B, and C are permanent structures and the area marked D is where a tent will be erected. The shaded areas mark locations for outdoor exhibits; indoor exhibits will be shown in all the buildings. The Ector County Auditorium is shown in the center of the photograph.

MEETINGS

Mississippi Field Trip

JACKSON.—Final plans have been completed for Mississippi Geological Society's eighth field trip, "Cretaceous of Mississippi and Southern Tennessee," which will be held October 13-15. Headquarters for registration will be the Lamar Hotel, Meridian, Miss., on October 12, and the trip will begin from there October 13.

The Cretaceous section of northeastern Mississippi and southern Tennessee will be covered, with special objectives being the study of facies changes in beds of Navarro and Taylor age on the outcrop.

Individual reservations can be made at the Lamar in Meridian for October 12, and at the Tupelo Hotel in Tupelo, Miss., for October 13-14.

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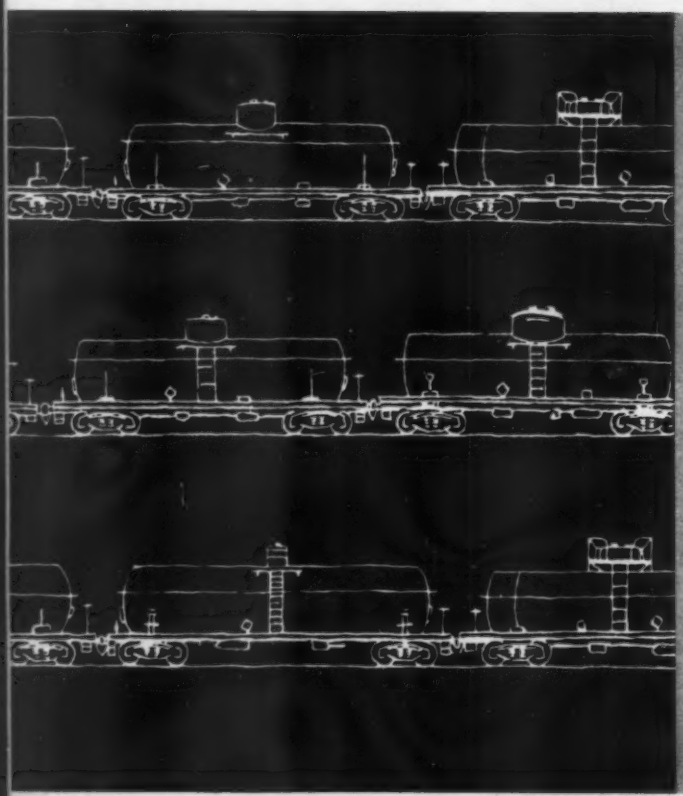

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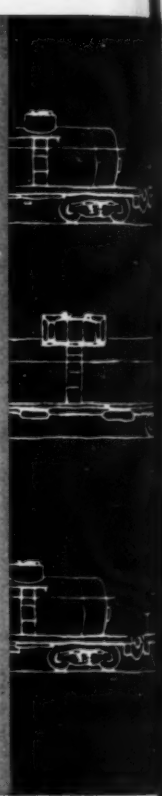

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A.I.E.E. to Oklahoma City

OKLAHOMA CITY. — Several papers pertaining to electrification practices in the petroleum industry will be presented at the fall general meeting of American Institute of Electrical Engineers, which will be held at the Skirvin Hotel here October 23-27.

Gov. Roy J. Turner of Oklahoma will deliver the opening address, and W. B. Stephenson, chief engineer, Southwestern Bell Telephone Co., will preside as general-meeting chairman.

EASTERN

Penn Grade Price Raised

Pennsylvania Grade crude oils were given another 10-cent price boost effective October 9. The Joseph Seep Purchasing Agency of South Penn Oil Co. announced the new postings of $4.10 a barrel for Bradford-Allegheny and middle district crudes, $3.67 for crude from southwestern Pennsylvania, and $3.61 for Pennsylvania Grade crudes purchased in West Virginia and Ohio.

This latest raise is sixth in a series of price increases that started December 12, 1949. Before the December advance Bradford crude was selling for $3.40 a barrel. The same crude brought $5.00 a barrel in 1948.

TECHNOLOGY

A.I.Ch.E.

Oklahoma group studies latest developments

R. B. Tuttle

TULSA. — Guests and members of the American Institute of Chemical Engineers attending the society's 1-day technical meeting here October 7 were given first-hand reports on a number of the latest developments in natural-gas and refinery-processing operations.

The group of 175 engineers, registered for the three-session meeting, were told of Texaco's new knock-free engine and of the relative position of centrifugal and reciprocating compressors in the oil industry. Six other papers dealing with processing and processes directly were also presented on the three-session program.

B. R. Carney, manager of Warren Petroleum Corp.'s gas department, discussed the utilization of the nation's petroleum reserves in his paper, "Natural Gas Liquids, a Major Source of Motor Fuels." Carney pointed out that to bring reserves utilization into balance greater use of natural-gas liquids is necessary since there is a relatively greater demand for liquid fuels in the gasoline range. He also brought out that practical economic recovery is believed to be 70 per cent above present figures, equivalent to 140,000,000 bbl. yearly. Although this increased recovery will be at higher cost, it can be accomplished more economically than by the synthetic processes for liquids from coal and shale.

Development in natural-gas processing plants have aided substantially in the conservation of America's reserves. V. E. Middlebrook, consultant, Tulsa, outlined in his paper, "History and Recent Developments — Natural Gas Processing," which traced these developments from the early plants to today's modern installation. In his discussion Middlebrook pointed out the various present schemes of removing the light gases absorbed in the main absorber while retaining the desired liquefiable hydrocarbons, and discussed their relative merits.

Platforming. — The new process of Universal Oil Products Co., Platforming, was described by Vladimir Haensel in his paper which opened the refining session. Dr. Haensel reported on the results obtained in operation of the first commercial Platformer. This unit has processed more than 200,000 bbl. of a reactor feed over the initial catalyst charge.

Important to many refiners was the paper, "Economics of Petroleum Coking for Catalytic Cracking Feed Preparation," by J. W. Jewell, Jr., M. W. Kellogg Co. Jewell, head of yields and economics division of Kellogg's process engineering department, based his economic study on an imaginary refinery which incorporated all facilities necessary to today's plant.

Discussion by Arthur L. Kohl, Fluor Corp., Ltd., took up the effectiveness of the many known processes for removing H_2S and CO_2 from gas streams. Kohl compared the different ethanol amines and reported on recent results obtained with a promising new material, methyl-diethanol-amine (MDEA).

T.C.P. engine.—Performance of Texaco's new knock-free engine was discussed by W. T. Tierney, project leader of the T.C.P. engine-development group at Beacon Laboratories. The widely discussed Texaco Combustion Process (T.C.P.) engine's thermal efficiency was compared with that of the diesel and otto engines and its performance on a wide range of fuels was reported by Tierney.

Factors affecting the choice of both compressors and their drivers were outlined by T. P. Latimer, Clark Brothers, Olean, N. Y. Latimer stressed the point that because of inherent differences in their characteristics, a given situation does not favor both reciprocating and centrifugal compressors. He also set out the factors governing selection of both types of compressors and discussed their respective types of drivers.

A description of Stanolind Oil & Gas Co.'s 90-ton per day sulfur plant was given by Maurice Webb of Stanolind. This plant processes hydrogen sulfide recovered from natural gas to elemental sulfur. Webb gave information on the critical factors governing conversion and product condensation. He also discussed the unusual precautions required to assure continuous operation of the plant.

Moderator of the natural-gas session was W. L. Nelson, technical editor of The Oil and Gas Journal, consultant, and professor of refining at Tulsa University. J. E. Swearingen, Stanolind Oil & Gas Co., presided over the refining session with W. C. Perry, Phillips Chemical Co., the gas-products session moderator.

***PRESENTED PAPERS.**—These industry men delivered papers pertinent to the industry at the Oklahoma state meeting of American Institute of Chemical Engineers in Tulsa last week. Left to right: J. W. Jewell, Jr., M. W. Kellogg Co.; Arthur L. Kohl, Fluor Corp., Ltd.; V. E. Middlebrook, consultant; Vladimir Haensel, Universal Oil Products Co.; W. T. Tierney, The Texas Co.; T. P. Latimer, Clark Bros., Inc.; B. R. Carney, Warren Petroleum Corp.; and Maurice Webb, Stanolind Oil & Gas Co.*

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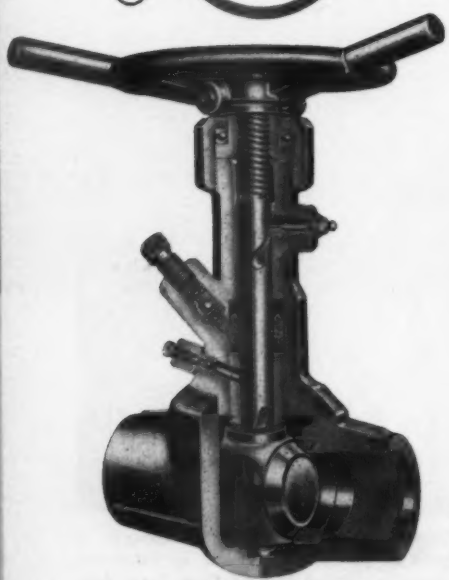

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ASIA

Assam Earthquake

Storage tanks took brunt of August 15 tremor, but Assam Oil Co.'s Digboi refinery suffered only slight damage

STORAGE tanks in Digboi oil field took the main punishment when the earth danced more than 4 minutes during the major earthquake that rocked the province of Assam, India, on August 15. The tanks had been sheathed with brick as a war protection.

Refinery equipment and well riggings were only slightly damaged although the field was less than 100 miles from the probable epicenter of the earthquake located in the eastern Himalayas of Upper Assam. Lessening temblors occurred for more than a month after the main shock.

The field's escape from damage or tragedy appeared remarkable when compared with destruction of property and loss of life in the surrounding area. Roads and railroads were cut. Rivers dammed by mountain landslides released floods which swept away villages, tore out bridges, inundated large districts, and caused heavy loss of life.

Among the 7,000 employes of Assam Oil Co., Ltd., a subsidiary of Burmah Oil Co., Ltd., no fatalities nor injuries were suffered. The company's housing areas were badly shaken, serious damages occurring in some parts.

Wells.—Due to the date being the anniversary celebration of India's independence, the field was closed, all drilling having been suspended. Five drilling wells had 7,771 ft. of open, uncased hole. Of this footage only 868 ft. of reaming was found necessary, 449 ft. in one well. This was not abnormal and it was concluded that the violent earth movement did not affect the uncased hole.

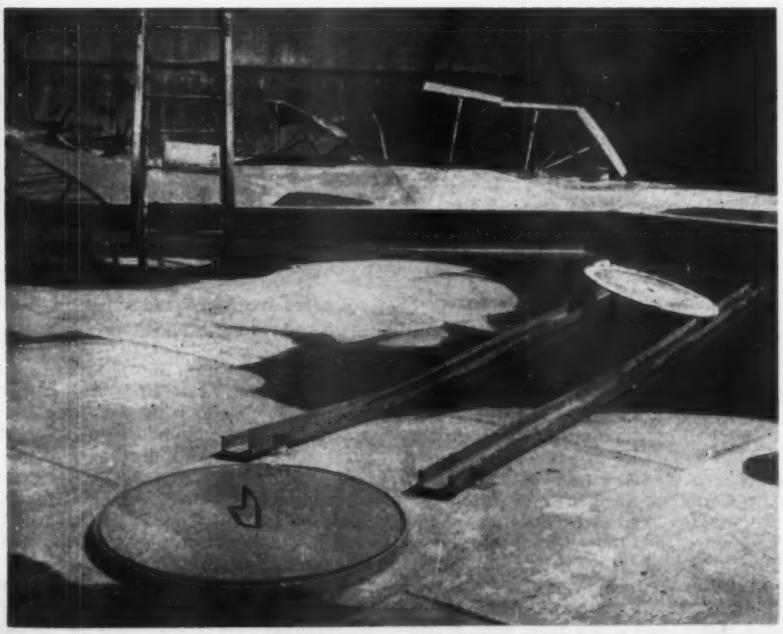
In the producing well, the casing in one appeared to have parted. This casing was set in 1912, and of a quality thinner than the ordinary oilfield standard. In one low-lying area a considerable disturbance had altered the surface of the ground. Cracks appeared and a number of pumping wells were put out of action.

Refinery. — The refinery was on stream during the earthquake period. A Lummus crude distillation unit, a Dubbs cracking unit, a P.D. rerun unit, and a batch of Alfa-Laval centrifulgal separating machines continued their operation free of damage. Most of the instruments in the refinery were unaffected, but the atmospheric tower-top temperature controller on the Lummus unit recorded evidence that the tower top 112 ft. high swayed considerably. Refinery technicians considered it miraculous that no vapor mains parted. They had expected the separators would act as gyroscopes during the quake and anticipated heavy damage there.

Violent earth movement in Assam Oil Co.'s field bent this pumping jack and casing out of alignment.

Tanks.—Six tanks were damaged in the refinery tank farm and in the products tank farm 20 miles away. The roofs were swung through some 20° and the rails, tie rods, stair guides, and other parts, torn away. In four tanks the liquid movement was so great it slopped over into the surrounding dike. In four tanks the roofs tilted above the tops so the seal shoes sprung out and were torn off as the roofs came down.

The largest tank had a 2,000,000-gal. capacity, and its contents of crude oil measured 1,840,000 gal. Four of the tanks were of 1,000,000-gal. capacity, and were nearly full of crude oil or gasoline. All these tanks had floating roofs. One tank with a fixed roof had a capacity of 500,000 gal., and was nearly full of vaporizing oil. In this tank the surge of liquid tore the roof away from the top strake for 14 ft. No damage was done to the tank shells and no rivets were sprung.



Amount of twist given to the floating roof of a crude-storage tank during the earthquake is shown above. Note angle between stairway and its runner rails on the roof.

LATIN AMERICA

Barco Success

Colombian Petroleum Co. well makes 650 bbl. daily

LIGHT Cretaceous oil production has been tested in a well drilled by Colombian Petroleum Co. on the North Sardinata structure west of Petrolea in the Barco concession in Colombia.

The 2 North Sardinata, located about 150 m. south and west of a nonproductive Tertiary well drilled in 1940, showed for a production of 650 bbl. daily of 54°-gravity oil in tests carried out over a 10-day period in the interval between 8,280 and 8,305 ft.

The well was subsequently cored to 8,420 ft. and the entire interval again tested. At latest reports, it was coring at 8,682 ft. The well will be carried deeper, up to another 1,000-1,100 ft., in order to explore the section completely. The oil is obtained from the Aguardiente formation, the same Cretaceous zone that produces in Petrolea and the light oil in Tibu field to the north.

The well drilled in North Sardinata in 1940 was taken to 5,005 ft. Another Tertiary test was made about the same time to 4,717 ft. on the South Sardinata structure and flowed considerable dry gas. In its current exploration of these areas, Colpet is expected later to test the Cretaceous in South Sardinata.

The North Sardinata well is about 8 km. west of the Petrolea camp and a short distance north of the South American Gulf Oil Co. 12-in., 263-mile line which moves Barco crude from the concession along to Venezuela border to a tidewater terminal at Covenas south of Cartagena.

Field declining.—Successful development of the Sardinata area would provide production to supplement the present Barco output which has been running steadily at about 25,000 bbl. daily. Petrolea field, completely drilled up, is in natural decline but this is being offset by continued work in Tibu. Petrolea now produces 1,000 to 1,500 bbl. daily. The deep zone in Tibu produces 6,000 to 7,000 bbl. daily, with the remaining Barco production coming from the Tibu Tertiary. Two rigs are used in field locations in Tibu, one on the deep zone and one in the Tertiary.

A fourth rig will be put in operation in the Barco in October when the company spuds in its Cretaceous test in the Rio de Oro area about 40 km. north of the north end of Tibu. Foundation is now being built.

Rio de Oro was discovered in 1937 and has nine wells shut in. The program was halted after the outbreak of the war when the nine wells producing from between 1,800 and 1,900 ft. had been drilled. The new deep test will be drilled in this field. The company's program includes opening up these existing shallow wells and moving the production through a 4-in. line now laid as far north as the Rio Catatumbo.

Another drilling operation of interest in this general area is that being conducted across the Venezuelan border by Colon Development Co., Ltd. (Shell). This is the 8 West Tarra offsetting the south end of Tibu and recently reported below 8,250 ft.

New Discovery

Oil found on Argentine side of Tierra del Fuego

DISCOVERY of the first oil production on the Argentine side of Tierra del Fuego at the tip of the South American Continent has been announced by Yacimientos Petroliferos Fiscales, the Argentine Government oil agency.

At a location described as 20 km. northeast of Rio Grande, Y.P.F. brought in a well at 2,041 m. (6,690 ft.) which produced 10,000 l. (about 62 bbl.) daily. No other details on the discovery were given.

In Buenos Aires, an official statement attributed considerable importance to the discovery and said it was a further step towards attainment of self-sufficiency in petroleum while augmenting Argentina's reserves.

Tierra del Fuego, south and east of the Straits of Magellan, is divided by the north-south Argentine border. To the west, the Chilean Government oil organization has been developing production which was first found 5 years ago. The Rio Grande flows eastward to the Atlantic with the town of Rio Grande at its mouth.

The Argentine state company began exploration in the Argentine part of the island in December 1945. Considerable gas production was obtained in a well in May of last year, but the new discovery is the first to find oil. The single producing sand on the island is believed to thin out as it rises to the south and east.

Details secrets.—Although details of oil operations in Argentina are in general regarded as state secrets, some additional information has recently been made available on other Y.P.F. exploration.

A well producing 600,000 cu. m. (about 21,200,000 cu. ft.) daily of natural gas was recently brought in in the Canodon Seco area of Comodoro Rivadavia. The gas production is to be connected into the 1,100-mile gas pipe line to Buenos Aires.

In Plaza Huincul field, Y.P.F. has completed a new well good for 25 bbl. daily, and a gas well with a production of about 350,000 cu. ft. daily. The Ministry of Commerce and Industry in Buenos Aires said Y.P.F. in a recent period had completed five wells with a total production averaging 102 bbl. daily and in addition five gas wells for a total output of 31,590,000 cu. ft. daily.

The Argentine Government has recently created a new entity, the Direccion Nacional de la Energia (National Power Directorate) under the Commerce and Industry Ministry. Its function is to integrate government activities in the fields of liquid, gas, and solid fuel, power, irrigation, and water control.

EUROPE

Scheerhorn Test a Success

Another well in the newly discovered Scheerhorn field north of Georgsdorf in western Germany's Emsland region has been brought in as a producer.

Production was found in the interval from 3,380-3,410 ft. Initial output was 12 cu. m. (about 75 bbl.) daily through 1/10-in. choke. The well, Scheerhorn 8, located about 650 ft. south of the field discovery, was drilled by C. Deilmann Bergbau G.m.b.H. Three heavy rigs are now being used for development of the Scheerhorn structure.

The continued interest in exploratory work in western Germany is reflected in figures recently issued by the government's Geological Research Office showing that 29,055 m. (about 95,000 ft.) was drilled during May, not including 3,534 m. (11,600 ft.) in shallow core holes. The May footage was approximately the same as in April.

A large part of the core drilling is taking place in southern Germany, a region in which no production of importance is now obtained. More than one-third of the core drilling was in newly acquired concessions in Upper Bavaria and South Baden, particularly the districts of Augsburg, Freising, and Weildorf - Ueberlingen (Lake Constance).

Norway Plant in Operation

Operations have been resumed at Norway's single small specialty refinery, but reconstruction work is not yet quite complete. Work is continuing on a new blending and filling plant and a modern tanker quay.

The plant, which has a capacity of 1,000 bbl. daily and produces principally lubricating oil and asphalt, is operated by the Norwegian affiliate of Standard Oil Co. (N. J.). Located at Vallo, it was completely destroyed by bombing during the war.

While the refinery's capacity is small compared to Norway's total requirements, its production of high-quality products meets about one-third of the country's needs.

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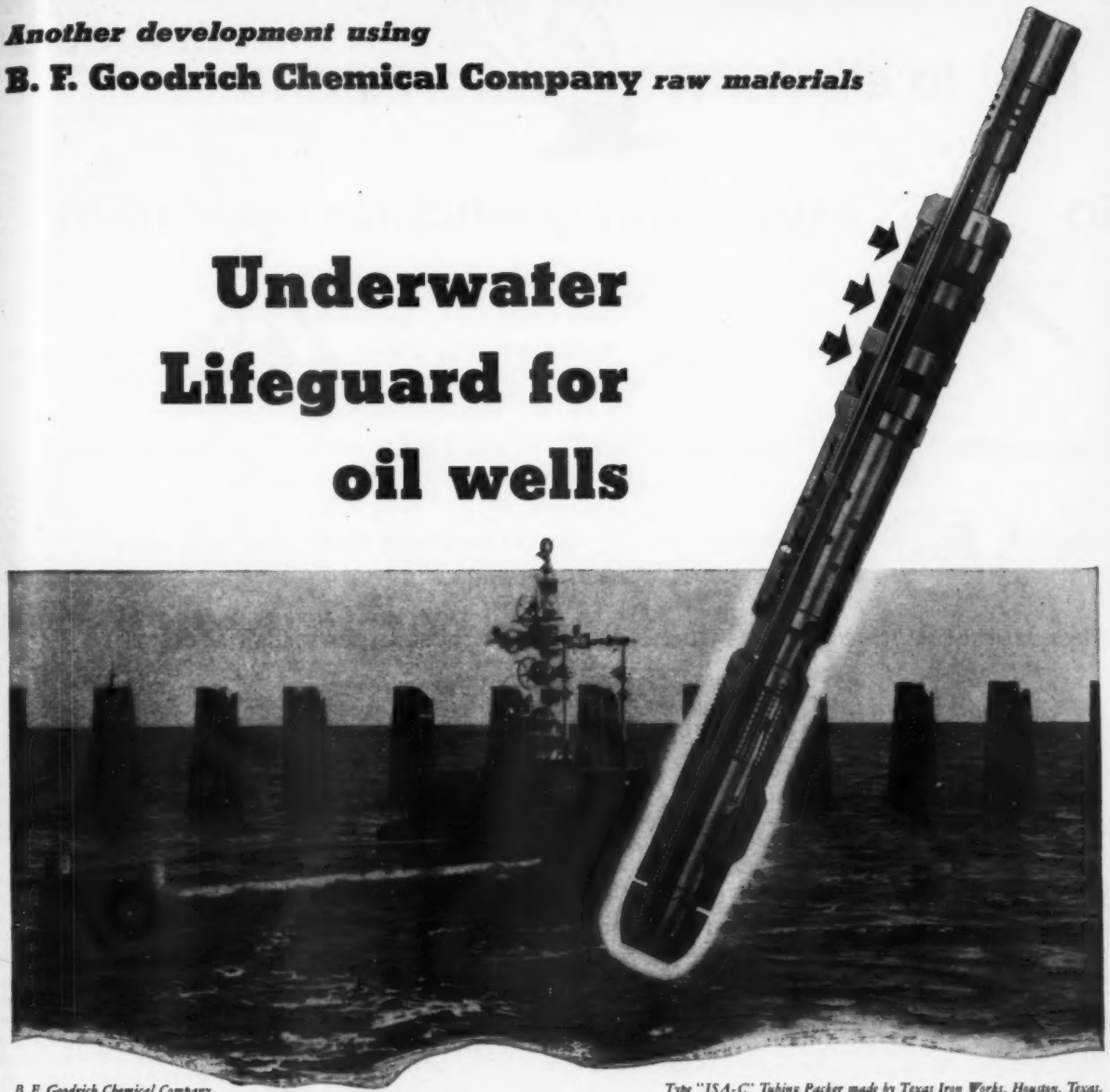

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This well recorded 12,635 psi bottom hole pressure. Maximum weight drilling mud—18.3 lbs. per gallon—was required to hold the high bottom hole pressure in check during final drilling and completion operations. Bottom hole temperature was recorded at 204°F.

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PERSONALS

Research Pioneer

Dr. Foote of Gulf has had distinguished career

DR. PAUL D. FOOTE, who heads the extensive research and development activities of Gulf Oil Corp., has had a distinguished career dating back to 1911 as a research scientist with the Government and in the petroleum industry.

As executive vice president and director of research of Gulf Research & Development Co., Dr. Foote directs the work carried on at Harmarville, Pa., near Pittsburgh, where Gulf has one of the industry's largest research establishments with a staff of more than 1,600 engaged in investigations in all types of petroleum operations. He is also a vice president of Gulf Oil Corp. and of Gulf Refining Co.

Dr. Foote received an A.B. degree from Western Reserve University, M.A. from the University of Nebraska, and Ph.D. from the University of Minnesota. He joined the National Bureau of Standards as a physicist in 1911 and, as chief of its pyrometry section, pioneered in the field of temperature measurement and control.

In 1921 he was made chief of the sections on radium, X-rays, and atomic structure following a period during World War I when he organized and directed the development of heat-control processes for the manufacture of optical glass. In 1926, he undertook a special mission to Europe to report on developments in the X-ray and radioactivity fields.

The following year Dr. Foote was appointed senior fellow of the Gulf fellowship at Mellon Institute. During the next 2 years he organized the research laboratories, becoming director of research when independent laboratories were established in 1930. He was named executive vice president of the research and development company when it was organized in 1933, and a vice president of Gulf and Gulf Refining in 1945.

During World War II, Dr. Foote was consultant to and a member of several government war agencies and a member of the Industrial Advisory Group to the Atomic Energy Commission.

Richard J. Cook, Oil City, Pa., has been appointed Midwest field service representative for the Pennsylvania Grade Crude Oil Association with headquarters in Chicago.

E. E. Thompson has been elected vice president in charge of refining for Mid-West Refineries, Inc. Other officers elected include: **R. J. Oosdyke,** vice president in charge of sales; and **J. D. MacLeish,** secretary-treasurer.

Ben D. Leuty, formerly chief civil engineer in Cities Service Oil Co.'s engineering division at Bartlesville, Okla., has been named special assistant in the company's crude-oil supply and transportation division. Leuty joined the firm as junior engineer in 1924. Other changes in the firm include: **Robert H. Griffin,** named administrative assistant to the manager and general superintendent of production; **George B. Ball,** appointed office manager; and **George W. Fries,** named chief clerk of the production division.

E. A. Dierdorff, Shell Pipe Line Corp., has been assigned to the position of project engineer with headquarters in Maracaibo, Venezuela, where he will assist in the construction of the projected pipe line to be built from Maracaibo to the Paraguana Peninsula. The following changes will take place to relieve Dierdorff for this work: **J. K. Alfred** will transfer to the engineering department head office, Houston, as operations engineer to assist D. H. Lewis; **H. E. White** will take over the duties of Alfred as acting assistant area superintendent in West Texas; and **J. E. Mims** will take over White's duties as acting superintendent of the Ozark Pipeline System. Others transferred to Venezuela by Shell are: **Clyde P. Wilson,** Bayou Pipe Line Co., division superintendent, as supervisor of materials and transportation with headquarters at Maracaibo; **W. D. Gregory,** pipe line maintenance foreman at McCamey, Tex., replacing **S. B. Bean** who returned recently from the "Steep Inch" project in Venezuela; **G. G. Billings; J. B. Churchwell;** and **C. K. Monroe.**

N. R. Royall, III, independent oil and gas producer, has moved his offices from Hanover, N. H., to Dallas.

Dr. Roy A. Wilson, geologist with Gulf Oil Corp., has been sent by the company to Beruit, Lebanon, to occupy a chair of geology which Gulf is assisting in establishing at the American University of Beruit beginning with the current term. Dr. Wilson, who has taught at several universities in the United States and been associated with the United States and several state geological surveys, will teach physical geography, engineering geology, and physical geology all new subjects for the Beruit University.

Walter G. Sterling, president of Sterling Oil & Gas Co., has been named chairman of the board, a position that has been vacant since the death of Ross S. Sterling, founder of

W. G. STERLING

R. G. RICE

the firm. **R. G. Rice,** vice president of Tennessee Gas Transmission Co., was elected president of Sterling Oil & Gas. **W. D. Walser,** secretary of Tennessee Gas, was elected secretary. Both will continue in their present positions with Tennessee Gas.

Chester E. English, formerly assistant general office manager for Ohio Oil Co. at Findlay, has been named assistant treasurer. He has been with the firm for 33 years.

Bob Larson, formerly engineer for Macoil Corp., Paramount, Calif., has joined Drilling & Exploration Co., Inc., Avenal, Calif., as mud and drilling engineer.

Oscar Gower, tool pusher for Hondo Drilling Co., has been transferred from Morton, Tex., to Snyder, Tex., in the same capacity.

B. David Meltzer, graduate student of the University of Oklahoma, Norman, has joined The California Co., at Leesville, La., as petroleum engineer.

Orville E. Moore has joined Panhandle Eastern Pipe Line Co. as corrosion engineer with headquarters at

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PERSONALS

Zionsville, Ind. He replaces **John C. Berringer,** who has been transferred to Kansas City to assist **D. K. Stephens,** superintendent of transmission pipe lines, in cathodic-protection work.

Earl L. Wilson, Jr., plant engineer at Kilgore, Tex., for Magnolia Petroleum Co., has been transferred to Dallas as junior mechanical engineer.

J. L. Boyd, chemist for Carthage Corp., Carthage, Tex., has resigned. He has not announced his future plans.

Virgil Ralph Chamberlain, geologist for General Petroleum Corp., has resigned and is opening offices in Great Falls, Mont.

Wilford Lee Stapp, geologist for Sunray Oil Corp. at San Antonio, has been transferred to Abilene, Tex., as district geologist.

George F. Eustis, assistant mechanical superintendent at Esso Standard Oil Co.'s Bayway refinery, Linden, N. J., has been assigned to the Harvard School of Business Administration where he has enrolled for a course in advanced management. **Dale I. Watkins** will fill Eustis' position during his 3-month absence. **John B. Hanna** has been assigned as acting supervisor of the maintenance and construction division, and **Charles H. Degener** as acting assistant supervisor of that unit directing the activities of all mechanical crafts as well as the regional engineering and planning groups.

Robert E. Butler, geophysical supervisor for Cities Service Oil Co. at Eunice, La., has been transferred to Houston in the same capacity.

L. E. Harrington, district geologist, and **John R. Lynn,** field geologist, have resigned their posts with Carter Oil Co., and opened consulting offices in Lewistown, Mont.

Arnold F. Lewis, tool pusher for Clemens Exploration Co. at Ludington, Mich., has been transferred to Cadillac, Mich., in the same capacity.

J. M. Duncan, tool pusher for Noble Drilling Corp. at Casper, Wyo., has been transferred to Duncan, Okla., in the same capacity.

Richard G. Taylor, Jr., formerly a student at Texas A. & M. College, has joined Atlantic Refining Co. at Odessa, Tex., as a petroleum engineer.

Joe Turner, Jr., has joined Associated Engineers, Inc., as engineer. He is a graduate of Texas A. & M. College.

H. S. M. Burns, president of Shell Oil Co., has been appointed to the 21-man petroleum industry committee on Military and Government Petroleum Requirements.

William S. Craft, John G. Dunlap, and **Daniel S. Borey,** engineers in the Esso Engineering department of Standard Oil Development Co., have changed positions. Craft was named senior project engineer, and Dunlap and Borey were named to group-head jobs.

J. L. Pike, assistant district petroleum engineer for Humble Oil & Refining Co. at Odessa, Tex., has been transferred in the same capacity to McCamey, Tex.

H. D. Jordan, former farm boss for Continental Oil Co. at Eunice, N. M., has been transferred to the North Cowden, Tex., area as district production foreman.

Ralph G. Stillinger, assistant chief engineer at the Houston refinery of Shell Oil Co., has been transferred to the Norco, La., refinery in the same capacity. Replacing Stillinger at Houston is **H. M. Karr,** former engineer and section leader at Berkeley, Calif.

Frank C. Smith, president of Houston Natural Gas Corp., was elected a director of the American Gas Association. He is also a member of the board of trustees of the Institute of Gas Technology, Chicago.

Don V. Eells, refinery manager for Cities Service Oil Co., Ponca City, Okla., has been transferred to the new Chicago plant and named manager of the terminal and compound department. **S. R. McMurray,** formerly foreman of cracking operations at the company's East Chicago, Ind., refinery, has transferred to Ponca City to succeed Eells. Eells joined the company in 1917, and after holding several positions was named refinery manager in 1942. McMurray joined the firm in 1924 as junior engineer.

U. S. ENGINEERS AID IN REFINERY CONSTRUCTION.—These 14 members of Standard Oil Development Co.'s engineering department are now in England in connection with construction of Europe's largest refinery, now taking shape at Fawley, near Southampton, England. The plant, owned by Anglo-American Oil Co., Ltd., British affiliate of Standard Oil Co. (N. J.), will have a capacity of 126,000 bbl. daily and will be placed in operation at the end of next year. Standing, left to right: James Acquaviva, William H. Shellenberger, Gabriel Riggio, David Clayton, Emanuel H. Shoemaker, William J. Knott, Jennings A. Allen, William E. Highfill, Nils M. Askman, and Louis C. Klubenspies. Seated: Frank J. Feely, Luther B. Martin, George B. McGuire, and Walter L. Sullivan. Standard Oil Development Co. assisted with the design and purchasing of equipment for the project.

PERSONALS

R. F. Baker, vice president and director of The Texas Co., New York, has been elected a director of the American Standards Association. He has also been nominated by the American Petroleum Institute for membership on the A. S. A. board of directors.

Cyrus T. Helm, who became a director of International Petroleum Co., Ltd., last year, has been elected executive vice president of the company. Helm has had many years' experience in the oil business, particularly in Central and South America. He is to leave International's headquarters in Toronto soon for Colombia and Peru in line with his new duties. The company is an affiliate of Standard Oil Co. (N. J.).

W. J. Armstrong, Jr., has been transferred by Ohio Oil Co. to Ardmore, Okla., in charge of the geological department. Other transfers to the new office there include: **Doug Harlow,** assistant geologist; and **Chester Dill,** formerly of Chickasha, Okla., geological scout.

R. J. Arnold, junior exploitation engineer for Shell Oil Co. at Midland, Tex., has been transferred to the Tulsa area. Other transfers include: **T. Bullard,** junior geologist in the exploration department, from the regional staff in Houston to Midland as subsurface geologist; **E. L. Emmel,** junior exploration engineer, from Midland to Houston; **A. F. Halcrow,** junior exploration engineer, from Midland to the head office at New York; **E. H. Judson,** district exploitation engineer at McCamey, Tex., to Odessa, Tex., as division exploitation engineer; **V. W. Krutsinger,** junior geologist at Houston, to the Midland area office as subsurface geologist; **E. D. Manly,** junior exploitation engineer at Houston, to Wasson, Tex., as exploitation engineer; **S. B. Nelson, Jr.,** junior mechanical engineer at New Orleans, to Midland; **R. K. Williams,** district mechanical engineer at McCamey, to Hobbs, N. M.; **R. S. Aberg,** junior exploitation engineer at Midland, to the regional staff at Houston; **J. P. Cogan,** junior exploitation engineer at New Orleans, to Midland; **J. R. Dodge,** junior exploitation engineer at Midland, to Houston; **H. E. Gray,** junior mechanical engineer at Houston, to Midland; **J. E. Michaels,** junior mechanical engineer at Houston, to Midland; **K. W. Robertson,** junior mechanical engineer at Houston, to Odessa; **C. P. St. Laurent,** junior exploitation engineer at Midland, to the Tulsa area; and **L. J. Willis,** junior exploitation engineer at Houston, to Midland.

W. E. Lake, superintendent in charge of construction for Bechtel Corp., Richmond, Calif., has been transferred to Cleveland in the same capacity.

Robert Davenport, seismograph party chief for Amerada Petroleum Corp., Sulphur Springs, Tex., has been transferred to Grand Junction, Colo., in the same capacity.

Frank P. Baughn, general superintendent of the East Texas division of San Juan Oil Co. at Tyler, has been transferred to the company's home office in Dallas as assistant to the president. He has been associated with Mudge Oil Co. for 30 years. The firm was recently purchased by San Juan.

Joe T. Morriss, chief inspector for Tennessee Gas Transmission Co. at Zanesville, Ohio, has been transferred to Meadville, Pa., in the same capacity.

Kenneth Davison, petroleum engineer at Dallas, is now located at Robinson, Ill.

Douglas Bundy has been named manager of production for Southern California Petroleum Corp. He has been with M. H. Whittier & Co. and Whittier & Associates for the past 14 years.

G. B. Shea, acting supervising engineer of the U. S. Bureau of Mines petroleum field office, San Francisco, has been named chief of the fuels technology division. **Harold C. Miller,** formerly supervising engineer of the petroleum and natural-gas branch at San Francisco has been named regional director. Shea has been with the bureau since 1928, engaged in petroleum-production research.

John K. Voorhees, formerly foreman of the gas plant at the Standard Oil Co. (Ohio) Latonia refinery, has been named process superintendent. **Harry Pforzheimer, Jr.,** has been appointed staff assistant in research and analysis, manufacturing department. He was formerly supervisor of the economics section in the refining control division at Cleveland.

A. J. Montgomery, division geologist for Phillips Petroleum Co. at Bartlesville, Okla., has joined Allied Materials Corp. and will head the land and geological department at Oklahoma City. He has been with Phillips for 22 years.

Aaron Permut has been appointed research and development chemist of Sun Chemical Corp.

J. S. Abercrombie, Houston independent oil operator, has been elected to membership on the board of trustees of the Texas Medical Center.

Robert Hopf, division geologist in San Antonio for W. C. McBride, Inc., has resigned to become a junior partner in the new firm organized by **Merle Becker** and **James P. Sloss,** independent operators of San Antonio **William McBride Love** of St. Louis, has been appointed Texas division manager for McBride, San Antonio, succeeding Sloss.

DEATHS

Arthur H. Walsh, 52, Amerada Petroleum Corp., died October 3 in Tulsa.

Elbert S. Rule, 81, organizer and president of Golden Rule Oil Co., died recently.

John B. Dupre, 61, dispatcher for Sinclair Refining Co., Linden, N. J., for 25 years, died October 2 in Union, N. J.

Donald G. Thompson, 32, personnel director for Creole Petroleum Corp. in Venezuela, died September 29 in East Orange, N. J.

Ross L. Heaton, pioneer geologist who had served with Maryland, Continental, and Union oil companies, died recently.

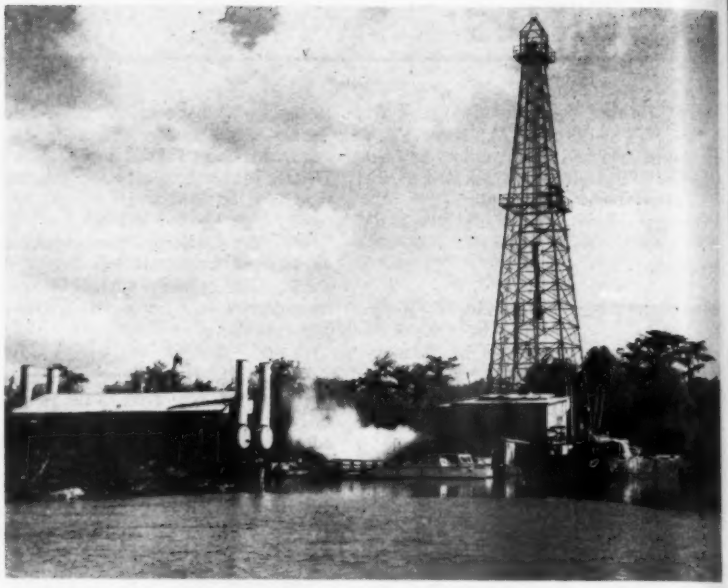
J. Grover Kelley, 65, part-owner of Hillman-Kelley Oil Manufacturing Supply Co., died October 1 in San Marino, Calif.

W. E. Huston, 64, president of Republic Oil Refining Co., and vice president of Plymouth Oil Co., died October 3 in Pittsburgh. Huston had been with the Benedum oil interests for 30 years and participated in the founding of Plymouth Oil in 1923. He was also president of Duval Gasoline Co., vice president-treasurer of Big Lake Oil Co., and vice president of Republic-Greenville Terminal Co. and of City Point Terminals, Inc.

XUM

MARINE OPERATIONS

As typified by West Lake Verret Field in Louisiana

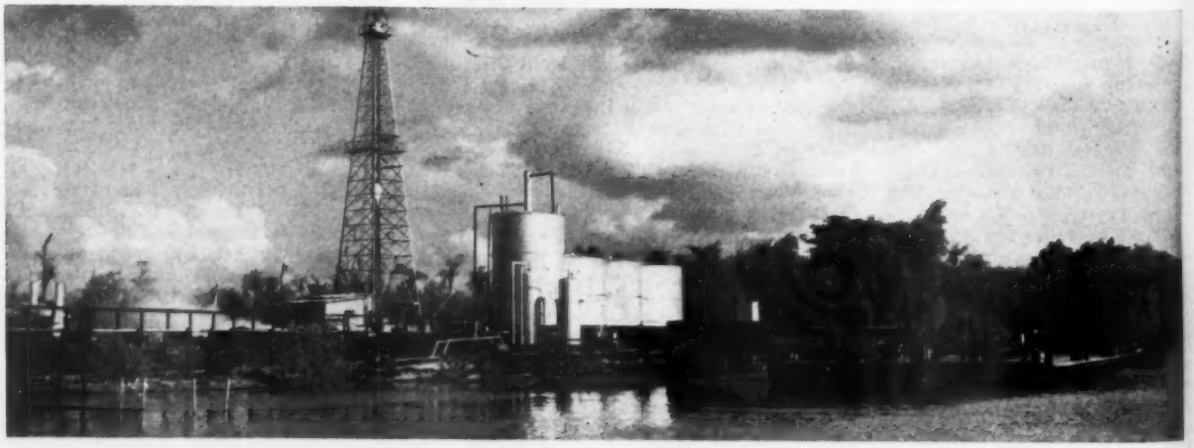


Above: Drilling equipment at Shell Oil's West Lake Verret field, Louisiana. The boilers and the drilling rig are mounted on barges which were towed to the site over miles of swampy waterways.

Left, above: There are no roads or highways in the area of the West Lake Verret field. Boats like those in the foreground take the place of cars and trucks, carrying men, equipment and supplies to the field.

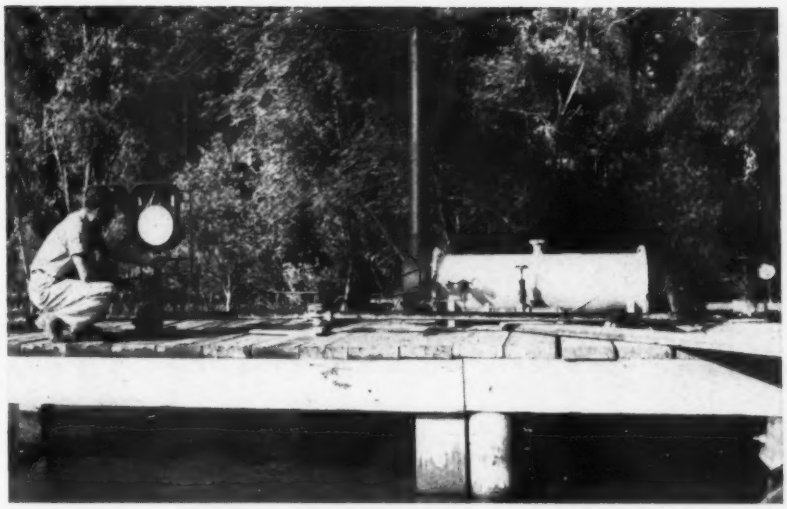
Left, below: Compressor barges are built in nearby cities, towed into place, and moved around the field wherever they are needed. They have been of great help in improving the efficiency of bayou-country oil operations. Before Shell developed a way to mount them on barges, compressors were placed on piling foundations, or on islands, if any were available. The construction of piling was particularly expensive because it involved bringing heavy machinery in to remote swampland and operating it there under unfavorable working conditions.

Below: This view of Shell Oil installations in West Lake Verret field is typical of oil activity in the Louisiana bayou country. Oil production is transported to distributing centers on barges such as the one tied up at right.

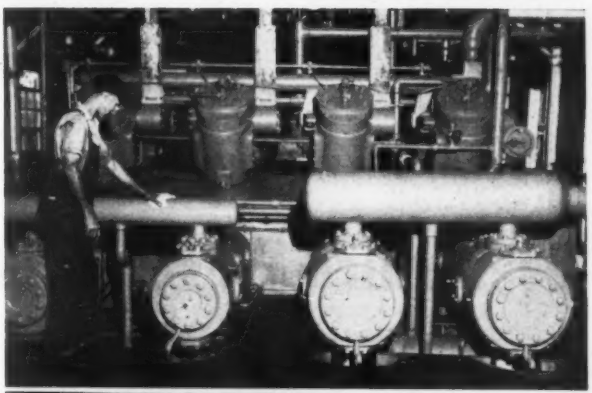


At West Lake Verret field, about an hour's ride north of Morgan City, La., Shell Oil Co. operates a typical bayou-country oil field. It is a marine operation from start to finish, with boats and barges substituting for cars and trucks. Men go to work in boats. Gagers check wells by boats. Drilling rigs, compressors and other heavy equipment are mounted on barges and floated in to location. This article shows "what's what" in this unusual type of marine drilling-production operation, via pictures taken "on the spot."

Shell drilled its first well in the West Lake Verret area in 1938, and now has about 40 producing wells there. The company is still conducting continuous drilling operations in the field.



Top of page: Compressor barges at West Lake Verret are joined to "central facilities" by a walkway which runs across the swampland. An injection gas heater is located in left foreground of this view of the installation.



Right, above: One of the 300-hp. barge-mounted compressors at Shell Oil's West Lake Verret field. Compressors deliver field gas to pipe lines in the area.

Right, below: Records of all wells in the West Lake Verret field are brought in to the "central facilities" office. Here they are compiled into reports which are forwarded to Shell's division office at Franklin. The "central facilities" office also keeps time sheets and other records on personnel working in the field.

Below: Shell men call this collection of buildings "central facilities." Besides a field office, it includes a warehouse, a complete boat shop, docks, a recreation room, and a shower-equipped locker room.

TANK BATTERIES.—Each set in photograph is a "lease." Well spacing in the 60 acres within N/2 NE/4 Section 31, 4n-15w, was all on "townlot" basis, and much less than 1 acre per well.

Overdrilled Placerita Canyon Nears Exhaustion

by D. H. Stormont
California District Editor

WHAT has happened to the Placerita Canyon 80-acre "townlot" field* which about a year ago was producing such a flood of oil that California's crude-oil price structure was upset? Today, just a little more than a year after active development was undertaken, densely drilled portion of the field is nearing exhaustion. In that area, locally known as the "hot spot," reservoir pressures are practically zero and the same is true of gas-oil ratios.

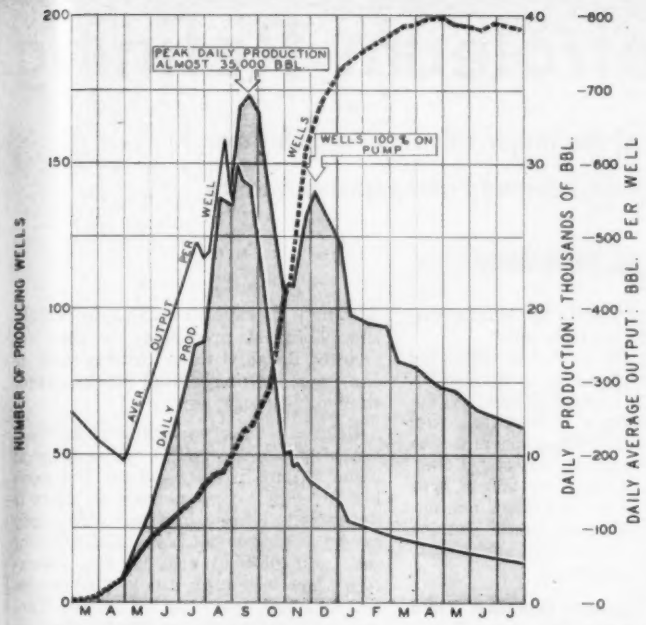
Placerita wells which less than a year ago were completed for initial production rates of around 2,000 bbl. daily, today are 10-bbl. pumpers. Briefly stated, therefore, the overdrilled portion has reached "old age" only a year after development was started.

Placerita Canyon's high-gravity or Juanita area was opened to production on February 28 of last year when Somavia Petroleum Co. completed 1 Juanita for 340 bbl. daily in a Pliocene sand at 1,737-1,831 ft. The old low-gravity area had been discovered in 1920, and the intermediate-gravity pool had been found in 1948.

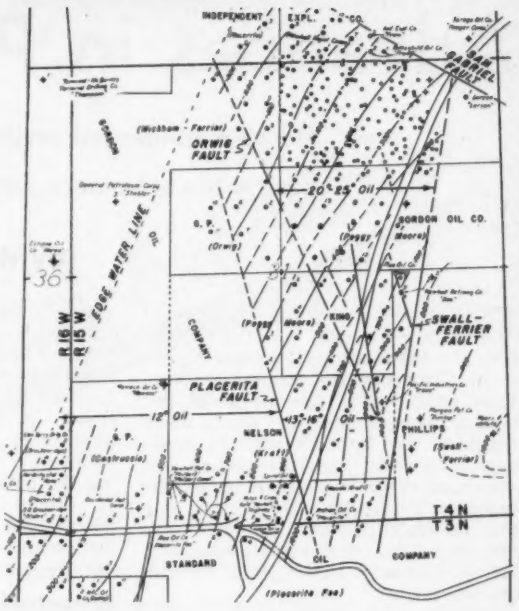
*For article giving first details on the drilling up of this "townlot" pool, see The Oil and Gas Journal, October 6, 1949, pp. 156-157.

Exploration has proceeded along orderly lines (and was continued in some areas) until development of the townlot portion in N½ NE Section 31 was under way. This 80-acre tract previously had been divided into 1/10-acre, widely held plots so that it was exceedingly difficult to piece together a lease even as small as 1 or 2½ acres. Normal development proceeded until in September 1949 when a California Superior Court invalidated the state's well-spacing law. Thus whereas a maximum density

MOUNTAINOUS.—Practically every drilling site was scraped off, via bulldozers, out of mountain ridges or canyons.



DEVELOPMENT DATA.—Chart shows number of wells drilled, daily average production for all wells, and average output per well per day. During the first few months of development, individual wells flowed as much as 3,120 bbl. per day. But decline was very rapid because of high well density, and all wells were soon on pump.



STRUCTURAL CONTOURS.—Map of Placerita area, Los Angeles County, California (contour interval equals 100 ft.). Principal faults, between which crude oil is of different gravities, are shown. (Map courtesy Robin Willis, geologist.)

of one well per acre had been permitted, the only limit on spacing then became the space required for a drilling rig. The result was that the area was drilled to a density of less than ½ acre per well.

In May of last year hot-spot operators also started the practice of unrestricted production, completely disregarding the MER's recommended by the Conservation Committee. With the return of the law of capture it was only logical that as development proceeded, deeper and deeper penetration was made in the 400-ft. sand section in an effort to obtain greater production.

The accompanying chart illustrates the rapid growth—and decline—in Juanita pool production. About 200 wells are on production of which about 160 are concentrated in 60 acres. Daily production, after reaching a peak of almost 35,000 bbl. during mid-September of last year, has declined steadily. Current production is below the 12,000-bbl. mark. How the pool has passed from flush to stripper production also is shown by the per well per day curve. In August 1949 the daily per well output of 44 producers averaged 633 bbl. Late in November, when all of the pool's 154 producers were on the pump, the average was 176 bbl. By the first of this year the average was down to 137 bbl. and at the end of June had further declined to 65 bbl. These per well figures include the output of approximately 40 wells drilled on the "wide" 2½-acre spacing. Their output serves to bolster the average per well figure since their production decline has been more normal. If the production from these wells are disregarded, the per well average for Juanita producers would be even less.

Also of interest is the decline in initial production rates as development progressed. Highest reported rate was 3,120 bbl. per day, by Rothschild Oil Co. 1 Guilford Community on August 1, 1949. Good wells with initials up to 1,000 bbl. per day were obtained until the end of October. After October, few completions reached 500 bbl. per day and by the end of December initials of more than 200 bbl. daily were exceptional. This year's completions, of which there have been about 25, averaged less than 100 bbl. in initial production.

Peak Reached in November

In addition to being overdrilled and overproduced, Juanita pool's casing-head-gas production has almost entirely been blown into the air. A solution - gas - drive reservoir, formation gas-oil ratios in early stages of the development were in the order of 200 cu. ft. per barrel. Because of the excessive rates of production, ratios steadily advanced until a peak of 1,300 cu. ft. was reached in November of last year.

Continued high rates of oil production resulted in a decline in gas-oil ratios, as the reservoir's supply was exhausted. Conservation Commission figures for the month of March estimated the ratio at 900 cu. ft. In the overdrilled area the current ratios of most wells are said to be so low as to be almost negligible.

At the beginning of the year the State of California, acting under a state conservation statute, sought to enjoin the operators from wasting gas. By then an estimated 3,219,437 M.c.f. had been produced and pressure depletion had largely eliminated the possibility of a correction so that the situation was crossed off as being hopeless.

In defense of their gas wastage, Placerita operators claim that no actual waste took place. The gas is of low heating value, about 600 B.t.u. per M.c.f., and contains about 20 per cent carbon dioxide; its gasoline content is only about 1 gal. per M.c.f. They point out it is of such low B.t.u. value that it is unfit for powering gas engines and that electric motors had to be used to drive pumping units. Thus they claim that since the gas had little or no value, and that no gas-utility company thought it worth while to gather the gas, the fact that it was blown to the air did not constitute waste.

Insofar as development in the town-lot area is concerned, from an economic viewpoint there is little doubt that it was overdrilled. Whether the unrestrained drilling and production practices followed have caused underground waste of oil cannot fully be ascertained at this time although most engineers believe such to be the case. At the end of June approximately 7,424,000 bbl. of crude had been produced from Juanita pool. the great bulk of which came from the overdrilled area.

Advances in Petroleum Refining

Here's a condensed review of the major advances which have been made to balance supply and demand and improve quality

by W. M. Holaday*

TODAY the flexibility in product balance is such that the refiner may, by installation of proper equipment, limit gasoline production from total crude to as low as 20-25 per cent or increase it to as high as 60-70 per cent. The latter is possible, however, only with high investment and operating costs. In contrast, when the industry was small and kerosine was the primary product, gasoline was disposed of in rivers and streams, and heavy residuals were poured on the ground.

The change in emphasis from fuel-oil and kerosine production to gasoline occurred in the United States during World War I. Since that time, gasoline consumption has increased from 20 per cent to over 40 per cent with a corresponding decrease in kerosine and fuel oil. While the total consumption of petroleum products is expected to increase markedly in the United States as shown in Fig. 1, the relative percentage of fuels as shown in Fig. 2 is not expected to change significantly during the next decade.

Similar, but less-expensive and not as well authenticated data involving other parts of the world are shown in Figs. 3 and 4. A review of these data will indicate that product consumption outside the United States most closely matches that which occurred in this country shortly after World War I. Such demand falls fairly well within the limits of what can be made available by simple distillation of many crude oils.

Fig. 5 charts the past and projected consumption of the various types of fuel oil in the United States. A decrease in the yield of residual fuel in favor of distillates is apparent. The effect of a reversal in this trend during the period covered by World War II, brought about by wartime demands for industrial and marine equipment, has been eliminated during the postwar years.

Processing to Increase Gasoline Yield and Quality

The demand for gasoline in the United States has been the motivating force in promoting almost all of the refining advances. Downward trends in fuel-oil yield have, of course, been a direct result, since these products are the source of incremental motor fuels.

Thermal cracking and reforming.—As indicated in Fig. 6, thermal cracking and reforming contributed markedly to over-all gasoline production from its inception through 1938. At this time, nearly 50 per cent of the gasoline consumed in the United States consisted of cracked material. Since then, the installation of thermal cracking has declined in favor of catalytic cracking. Thermal processing is now restricted largely to reforming and to the cracking of residual stocks rather than distillates.

Coking.—This variation of thermal cracking appears to be expanding to some extent in areas where the market price of heavy petroleum fuels is depressed either by an oversupply or by the comptitive influences of coal and natural gas. In this operation, the residual stocks otherwise suitable for use only as heavy fuel are decomposed thermally to produce gas, gasoline, and distillate fuels, along with an unavoidable residue of coke. The distillate fuels are used either as furnace oil or as charge stock to cracking units.

Catalytic cracking.—Initially, catalytic cracking was confined to the use of light-distillate charge stocks. More recently, heavier distillates and even deasphalted residual stocks have been used. Further developments in the field of cracking reduced crude and other residual stocks are now under way, but these stocks deposit salts and a large amount of coke on the catalyst, and these disadvantages must be weighed against the advantages of the catalytic processing over thermal processing.

Fig. 7 indicates the extent to which catalytically cracked stocks are replacing and supplementing thermally cracked stocks in motor-gasoline production in the United States. The installation of catalytic cracking equipment has been constantly expanding since the war until the charge ca-

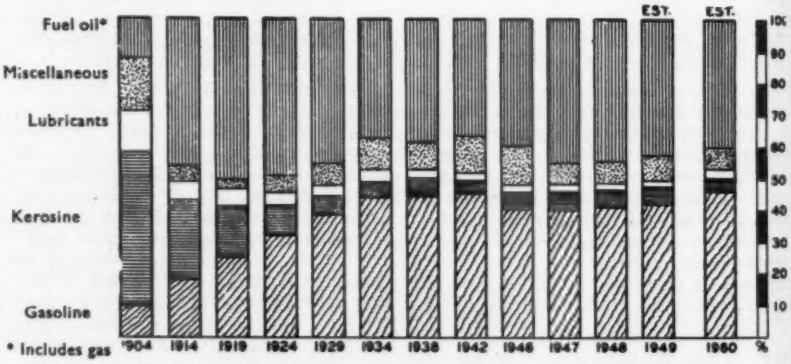


Fig. 2—Petroleum-product distribution in the United States.

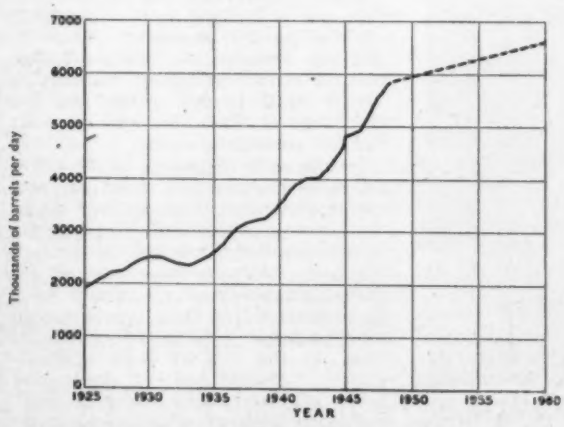


Fig. 1—Consumption of petroleum products in the United States.

*Director, Socony-Vacuum Laboratories, Socony-Vacuum Oil Co., Inc., New York. Portion of paper presented at Fourth World Power Conference, London, 1950.

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pacity is now approximately 1,500,000 bbl. per day.

Polymerization.—Over-all, polymer gasoline represents only a very small portion of total gasoline production in current operations. The capital cost involved in its installation is, however, relatively small, and polymer units are becoming more and more profitable adjuncts to catalytic cracking to supplement over-all quantity and quality of the gasoline produced.

Although polymer gasoline has an antiknock quality in the range of high-octane-number aviation fuels, it cannot be used for this purpose because of its olefinic character and resulting relative instability. Where an aviation-fuel component is desired, the polymer must be hydrogenated to give a saturated product.

Alkylation.—This is a more expensive process from the investment and operating standpoints than is polymerization. As a result of wartime requirements, alkylation capacity was expanded to about 150,000 bbl. per day. Since the war, much of this capacity has been operated to produce gasoline for automotive use.

Process for the alkylation of isobutane with ethylene have been developed, but commercial application has been retarded by high installation and operating costs, particularly those involved in ethylene recovery. Aluminum chloride and aluminum bromide have been found to be effective catalysts.

Isomerization.—Although catalytic cracking produces a sizable quantity of isobutane, the expanded alkylation facilities constructed during World War II could not have been filled had not butane isomerization been practiced commercially. This process uses aluminum chloride as a catalyst with anhydrous hydrochloric acid as a promoter. Installed capacity ultimately exceeded 30,000 bbl. per day of isobutane, much of which has been converted to other types of operation.

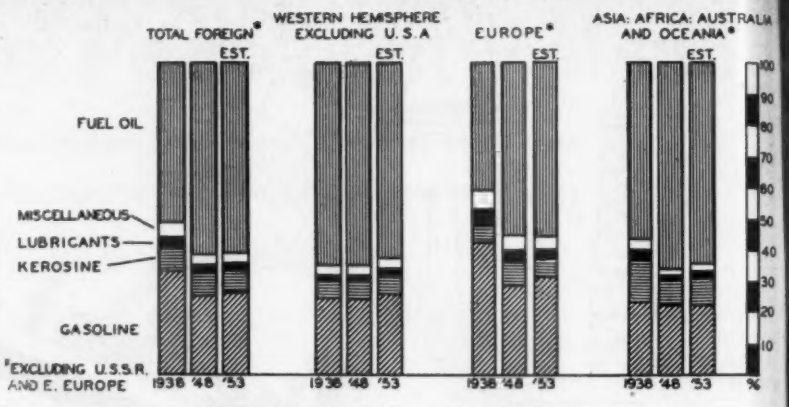


Fig. 4—Foreign petroleum-product distribution.

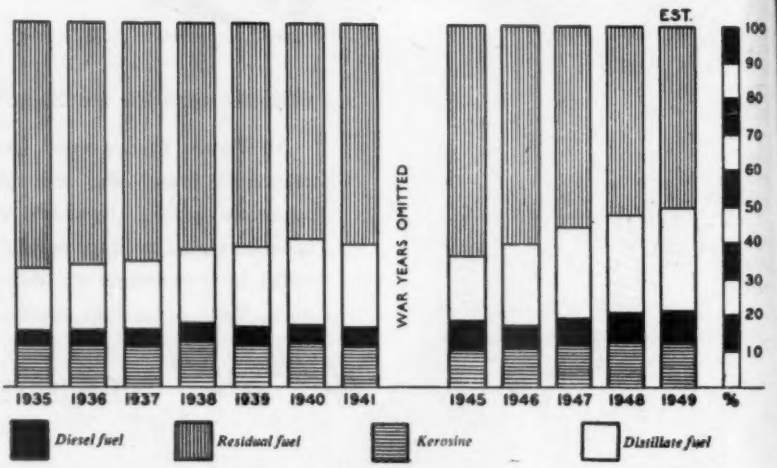


Fig. 5—Relative production of fuel oils in the United States.

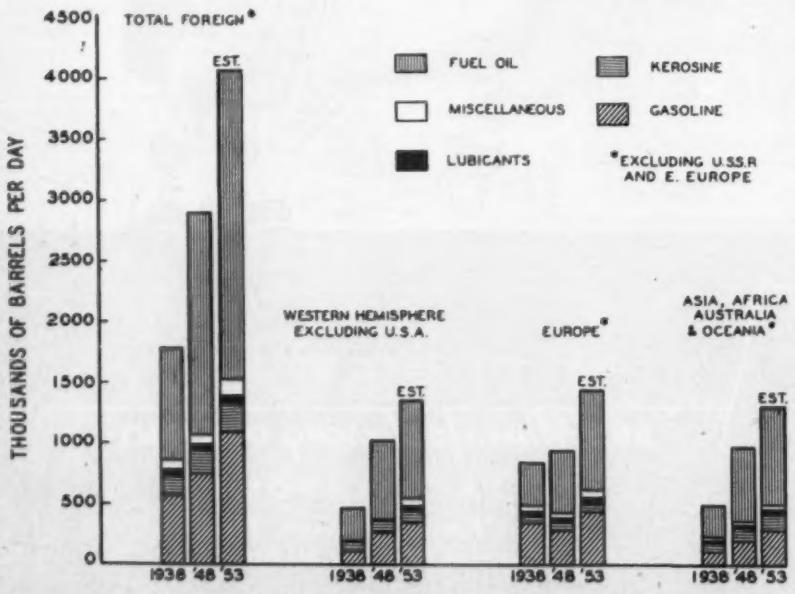


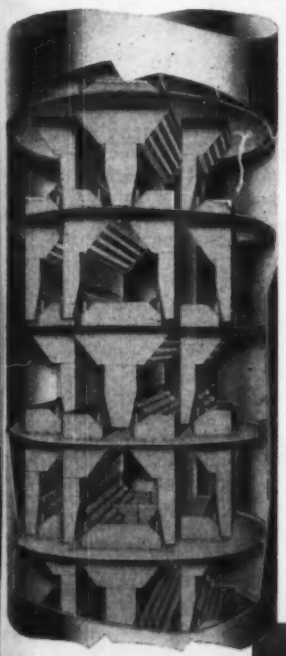
Fig. 3—Foreign petroleum consumption.

Isomerization of other light-gasoline fractions, including pentane, hexane, and heptane, has also been accomplished commercially. This reaction is carried out in the liquid phase, and the catalyst employed is an aluminum chloride - hydrocarbon complex, using hydrogen chloride as a promoter and hydrogen as a cracking suppressor.

Polyforming.—This is a thermal process but utilizes propane, propylene, butane, and butylene, in addition to heavy naphtha, as a charge stock. The gaseous components of the charge which might otherwise be refinery fuel are converted—polymerized—to a substantial degree in the processing to gasoline. The nominal capacity in operation in 1949 was 70,000 bbl. per day.

Hydroforming.—A catalyst and hydrogen recycle are required in this process. In addition to producing a high-octane-number gasoline—arising largely from aromatization of the feed—the process desulfurizes the feed stock by depositing most of the sulfur on the catalyst. This is oxidized to sulfur dioxide during the catalyst-regeneration step, and rejected from the system. Hydroforming is, therefore, of particular value

to the man with a fractionating problem



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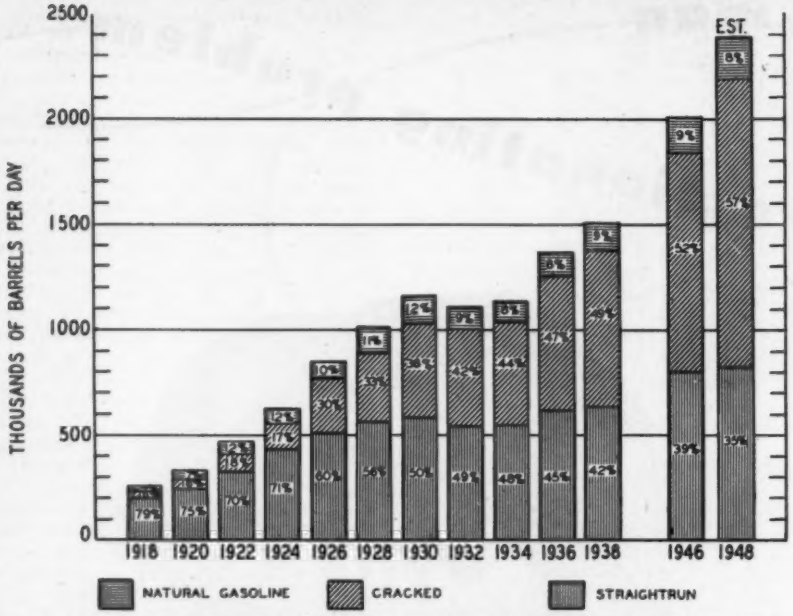

Fig. 6—Consumption of motor fuel in the United States showing expansion of cracking.

in processing high-sulfur naphthas to improve their susceptibility to tetraethyl lead, as well as to improve inherent antiknock quality. Nominal capacity for hydroforming operations was 85,000 bbl. per day in 1949.

Gasoline treating. — The refining techniques that have been adopted to make more gasoline of a higher-quality level out of crude petroleum, have had a secondary effect upon the industry in requiring additional treating steps to make some of these products more effective from the utilization standpoint, and more acceptable from the marketing standpoint.

Stability of gasoline distilled directly from crude petroleum offers no problem. On the other hand, gasolines obtained by the decomposition of heavier hydrocarbons by conventional thermal or catalytic cracking may contain varying amounts of olefins, diolefins, active sulfur compounds, and small quantities of oxygenated compounds (phenolic type), which may react with each other or may be oxidized by air during storage or in automotive fuel supply systems.

Most effective oxidation and gum inhibitors have been developed, which accomplish the same results as chemical treating at a much lower cost and at no loss in yield. These inhibitors, a number of which are available, are generally effective in concentrations less than 0.005 per cent in the average gasoline blend.

Aviation-gasoline specifications impose more restrictive stability requirements than do motor-gasoline specifications. The most effective oxidation and gum inhibitor is not sufficient in the maximum quantity allowed (generally 0.003 per cent) to limit gum formation in the majority of catalytically cracked stocks to the limits imposed by the specifications. Three procedures were established during the war to make such stocks satisfactory: sulfuric acid treating, mild hydrogenation, and retreating in the vapor phase in the catalytic cracking unit. All have the advantage of further enhancing antiknock quality. Catalytic treating was used most extensively, but it had the disadvantage of using equipment time which might otherwise be utilized in the more profitable cracking operation.

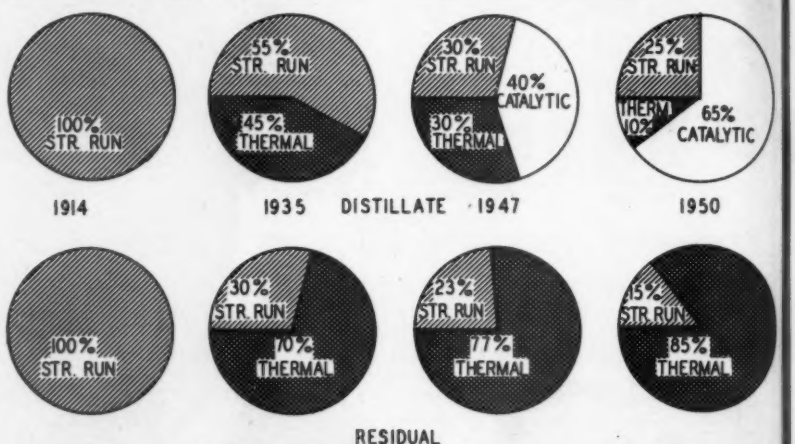

Fig. 8—Estimated distribution of stocks in fuel oils for prototype refineries.

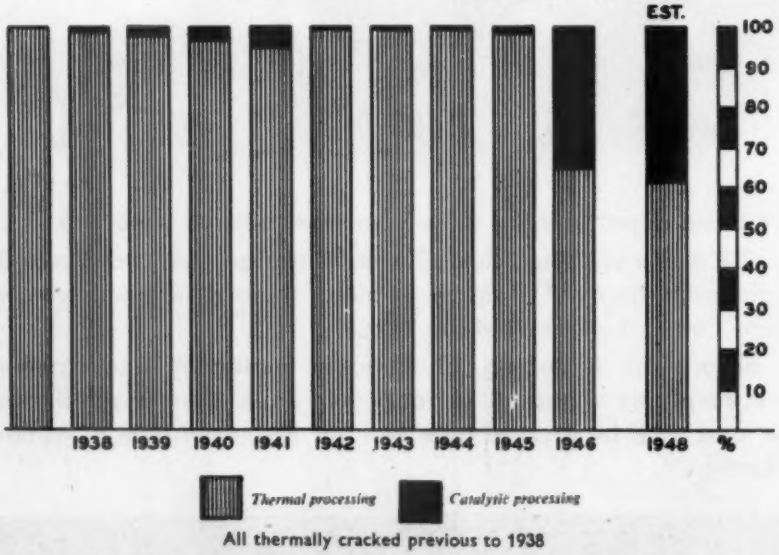

Fig. 7—Relative production of cracked motor gasolines in the United States.

Removal of light malodorous mercaptan sulfur compounds by caustic washing, and conversion of mercaptan sulfur to disulfides by the doctor technique using litharge, caustic, and sodium hypochlorite have been practiced for many years. More recent procedures accomplishing the same conversion utilize lead sulfide and copper chloride.

The disulfides formed in the above conversion treatments remain in the gasoline, and reduce the effectiveness of tetraethyl lead in improving the

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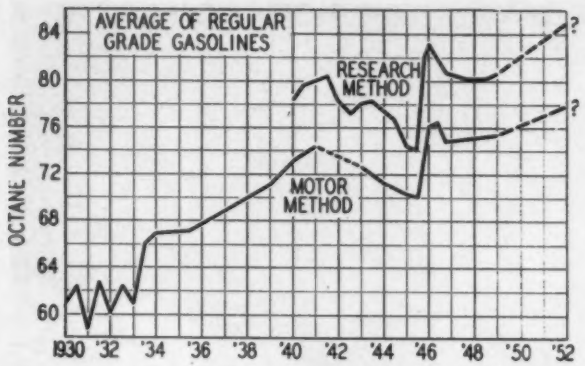


Fig. 9—Trends in antiknock quality of U. S. motor fuels.

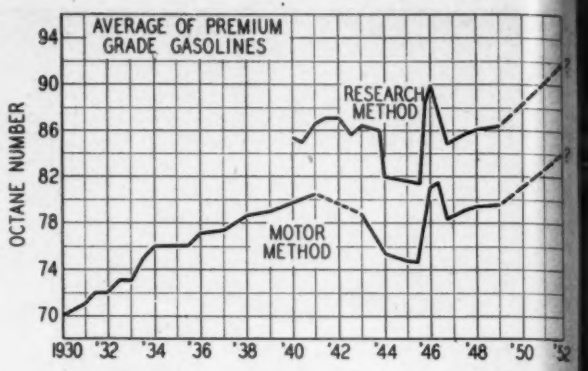


Fig. 10—Trends in antiknock quality of U. S. motor fuels.

octane number. Consequently, more emphasis is now placed upon removal of the mercaptans from the gasoline. Various solvent-extraction techniques are currently practiced in which various materials are added to caustic solutions to enhance their extraction efficiencies.

Where a gasoline stock of very high sulfur content is encountered, resort may be taken to sulfuric-acid treatment. This is not widely practiced, since yields are affected adversely, particularly with cracked fuels.

Effect on fuel oils.—With the inception of new processes for the production of greater quantities of gasoline there have, of course, been corresponding changes in the character and source of most fuel-oil distillates and residuals. One exception is kerosine. The restrictive specifications for this product, particularly the lamp burning test generally required, limit it largely to a high paraffinic fraction distilled directly from crude.

Fig. 8 illustrates an estimated distribution of the source of both distillate and residual fuel oils from a refinery typical of several periods over the past 40 years.

Trends in Motor-Gasoline Utilization

Quality demands.—Figs. 9 and 10 show the trends since 1930 in the antiknock quality of the regular and premium-grade gasolines sold in the United States.

In connection with these data it should be noted that the research octane number is now more widely accepted than the motor octane number, as a better indication of gasoline quality in vehicles on the road. Whereas there is little difference between the antiknock values obtained by these two procedures on straightrun gasolines, differences become increasingly greater with increased olefin and aromatic content of the motor fuel. Thus, thermally cracked and catalytically cracked fuels may have research octane numbers from 8 to 12 units higher than their motor octane numbers.

The data in Figs. 9 and 10 indicate a constant upward trend, except during the war years, when high-quality stocks and tetraethyl lead went to military gasolines, and during the period 1946 to 1948 when teraethyl lead was in short supply. From this information and expenditures on refinery equipment during the war, some basic figures may be cited on the cost of increased antiknock quality.

The extensive installation of catalytic cracking and associated facilities during the war years to meet high-octane-number aviation-fuel requirements cost the refining industry nearly $900,000,000. Between 1941 and 1946, the antiknock quality of regular and premium grades increased barely three octane numbers, in spite of the fact that aviation-fuel production had almost entirely been converted to motor gasoline by 1946. By simple division, this would indicate that an increase in over-all fuel antiknock quality of one octane number did cost $300,000,000 at that time. In the interim period, construction costs have nearly doubled.

In spite of the high investments necessary, the antiknock quality of motor fuels as marketed in the United States is increasing. This situation may be attributed to two factors: (1) the competitive spirit in the petroleum industry, and (2) recent developments in automotive design.

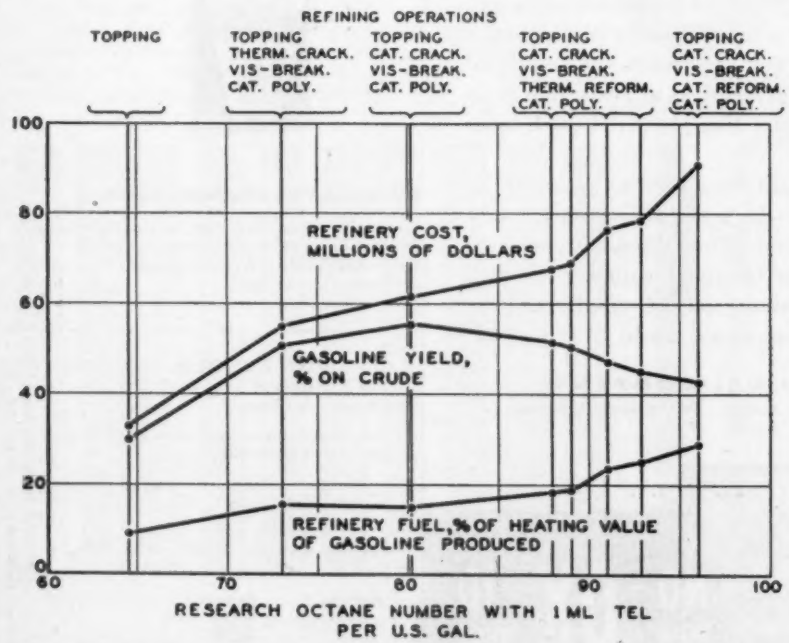


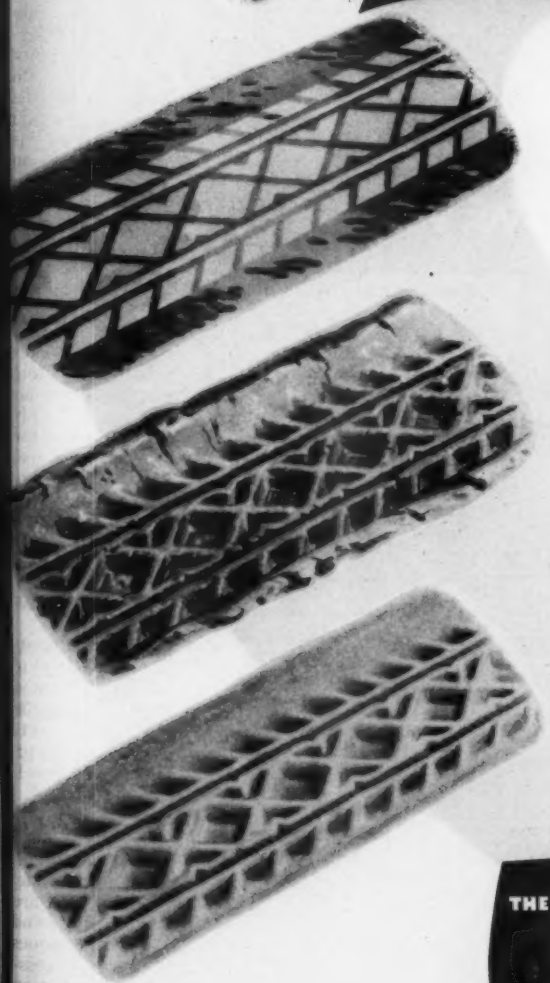
Fig. 11—Relation between octane number and gasoline yield, fuel requirements, and cost of a 100,000-bbl. per day refinery.

Future Processing Techniques

United States.—In the field of refining for the production of gasoline, more time, money, and manpower are currently being put into research and development or reforming techniques than any other single type of processing. The goal is lower installation costs by adapting truly continuous operation using lower pressures, and more specific catalysts with greater activity and lower cost. Hydrogen recycle will undoubtedly continue to be necessary to retain the desulfuri-

(Continued on page 95)

"NATIONAL BLUE" SERVICE STRIPES



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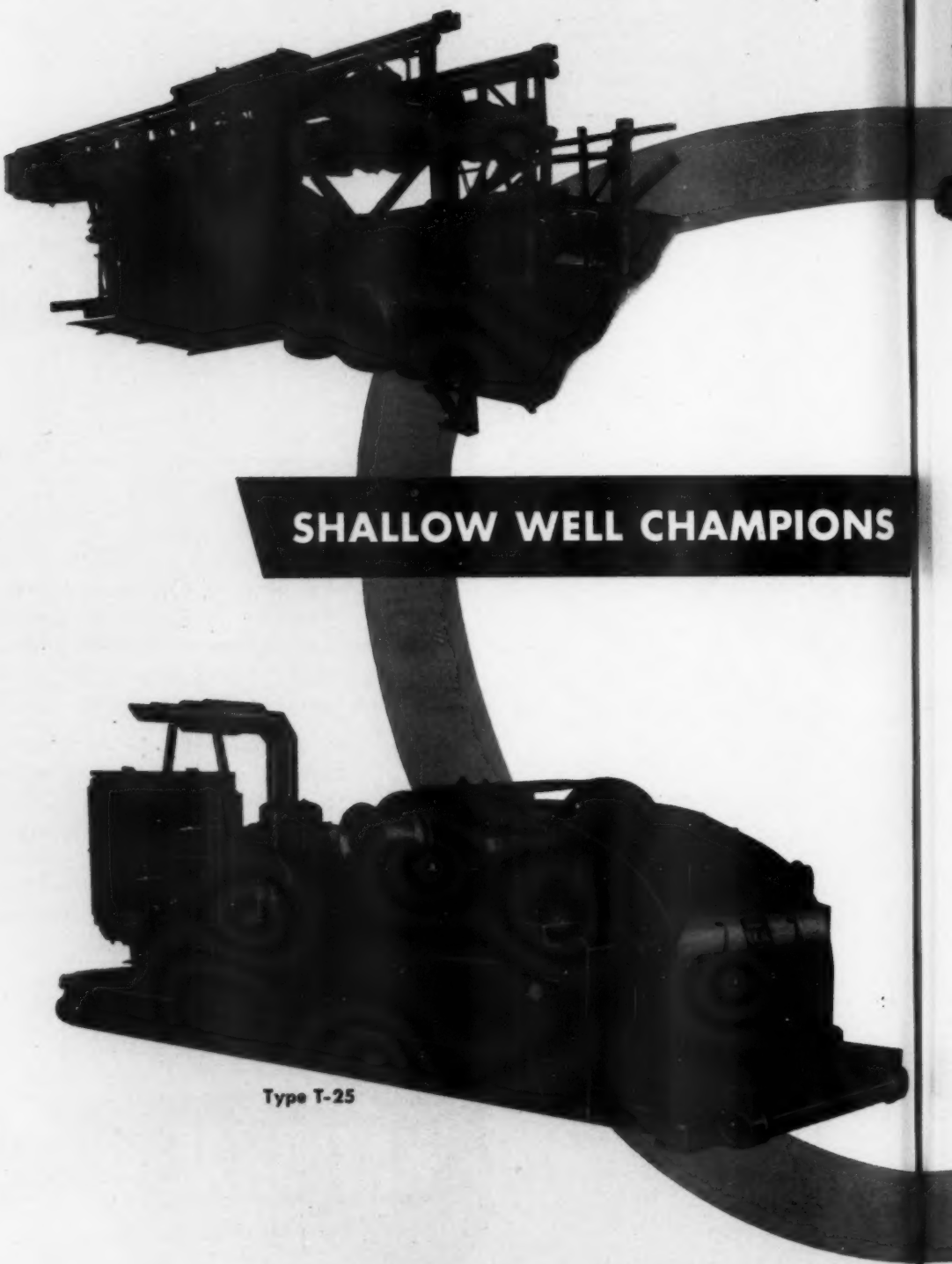

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NATIONAL OIL FIELD MACHINERY AND EQUIPMENT...SPANG PIPE...SUPERIOR & ATLAS ENGINES

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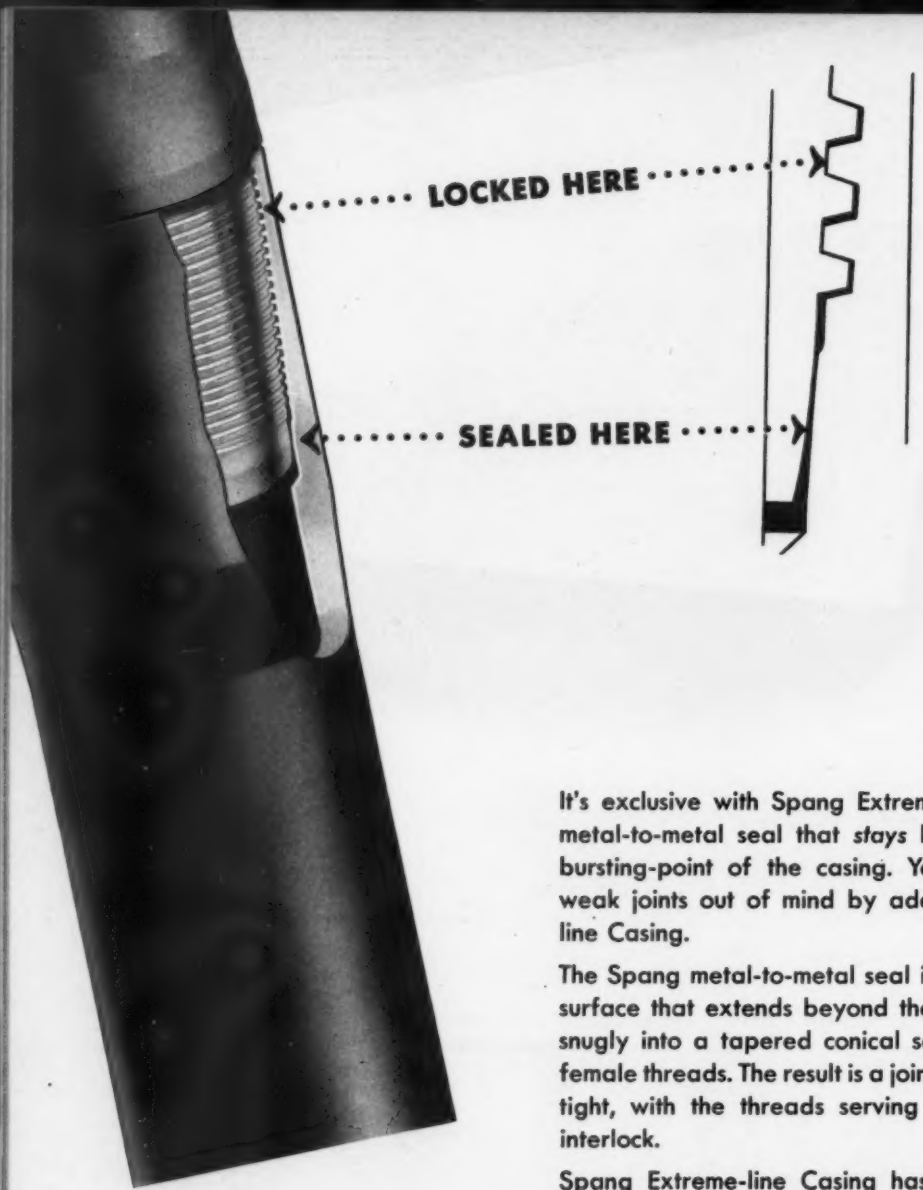

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The Spang metal-to-metal seal is made up of a curved surface that extends beyond the male threads and fits snugly into a tapered conical seat beyond the mating female threads. The result is a joint that's sealed pressure-tight, with the threads serving only as a mechanical interlock.

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NATIONAL OIL FIELD MACHINERY AND EQUIPMENT...SPANG PIPE...SUPERIOR & ATLAS ENGINES

zation characteristics which are so attractive in conventional hydroforming and to realize the high yields compared to conventional thermal reforming.

The path to greater yields of higher-octane-number motor gasoline is not a simple or inexpensive one. The past 10 years have seen a marked increase in manpower—5 times—and in money—10 times—poured into research and development activities in the petroleum industry. At the present time the United States petroleum industry is spending more than $100,000,000 every year on research and development work directed in large part to establishing better and cheaper ways of producing higher-quality gasoline.

As a further indication of the costs involved in obtaining high-octane-number gasoline, data on gasoline yields, equipment costs, and fuel requirements representing a sequence of refinery operating plans which might be employed to produce gasoline at varying octane number rating, are shown in Fig. 11. The simplest refinery, of course, would use only distillation, and would produce about 30 per cent of 65-octane-number* gasoline from a typical Mid-Continent crude. The heating value of the fuel used would be 9 per cent of the heating value of the gasoline produced, and the cost of a 100,000 bbl. per day refinery, complete with all auxiliaries, would be $33,000,000. The installation of catalytic cracking, visbreaking, and polymerization as means of converting fuel oils to gasoline—a total of 56 per cent would be obtained—would raise the octane number level to 80, the plant cost to $62,000,000 and the fuel requirement to 15 per cent based upon the gasoline produced.

Subsequent octane-number increases must be obtained by reforming of ever-increasing severity and extent. Reforming to 96 octane number, the limit considered here, would convert gasoline stocks to fuel gas and tar to the extent that the gasoline yield would be reduced to 43 per cent, while the plant cost would climb to $91,000,000 and the fuel use to 29 per cent. It can be seen from the shape of the curves in Fig. 11 that the higher octane numbers are extremely expensive on all counts.

Such is the situation today and the probable future trend in gasoline production in the United States. The octane numbers of the better gasolines currently being marketed are several units above the level of their prewar counterparts.

The competitive situation and automotive engine requirements have joined forces to increase antiknock quality further. The rate of increase will probably be slow, since huge investments will be required for new equipment to attain these higher levels. Research and development of new reforming techniques and cata-

*Research rating with 1 ml. of tetraethyl lead per gallon.

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lysts can, and probably will, make this task less expensive, but will take some time to accomplish.

When more efficient and more effective reforming processes are developed, their installation outside of the United States should be most attractive. Unlike thermal and catalytic cracking, they will not convert potential fuel oil, which is so highly desired now and in the foreseeable future, to gasoline, but will serve to increase the octane number of present-day motor fuels.

Fuel-oil processing will change to a certain degree, although the major change will result from the trend away from thermal cracking to catalytic cracking for the production of motor gasolines. As a result of this shift in gasoline-producing operations, distillate fuel oils for domestic heating, diesels, and certain industrial uses will consist for the most part of catalytic and straightrun stocks with relatively little thermal product. Residual-fuel-oil-production may also change somewhat, the cause for change being the reduction in relative demand for heavy residuals, effected in large part by higher crude runs to meet gasoline and distillate-fuel-oil demand, and by the increasing availability of low-cost natural gas.

A number of processing techniques are available to reduce residual-fuel-oil production, including vacuum distillation, vis-breaking, and coking. By resorting to these operations, increased quantities of distillate fuel or charge stock for catalytic cracking to produce gasoline are made available. Once again, the controlling factors will be economic conditions and the highly competitive situation which exists in the United States petroleum industry.

Europe.—Here and in other parts of the world, economic considerations and the compelling primary demand for fuel oil have not been conducive to the adoption of the more advanced refining techniques used in the United States. The relative usages of petroleum products in Europe and the United States give some measure of how much the petroleum industry, over-all, must expand outside the United States in order to have parallel conditions.

In Europe, excluding U.S.S.R., petroleum consumption is approximately 0.65 bbl. per person per year. In the United States, on the other hand, consumption per person is about 12 bbl. per year. With reference to gasoline, these figures are approximately 0.19 bbl. for Europe, and 5 bbl. for the United States.

It is apparent from these figures that the primary fuel-oil requirments of industrial areas such as Europe are far from being met, if the economies are to approach American standards. Consequently, it would appear to be some time before the conversion of fuel-oil fractions to gasoline will be practiced to any great extent outside of the United States.

This conclusion does not preclude certain types of processing which will improve the antiknock quality of gasolines. Thermal reforming is currently being practiced in some quarters, and expansions of this technique are under way. It can, therefore, be expected that if catalytic reforming methods should be developed which are more economical from the investment, operating, and yield standpoints, they should be readily adaptable to operations in those countries whose economy is based on fuel oil. Where reforming is practiced, be it thermal or catalytic, polymerization will probably be a profitable supplementary operation.

Without extensive thermal or catalytic cracking of residual fuel oils, gasoline treating will not be a particularly difficult problem. In those cases, however, where straightrun gasoline fractions and reformed fractions do contain appreciable quantities of mercaptan sulfur, extraction processes for its removal will probably be profitable to install.

Assuming that the European countries will draw largely upon Near East crude sources for petroleum supplies, high-quality kerosines and fuel oils will be readily available.

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Once again we are called upon as free citizens of a free country to exercise our rights in the determination of who shall lead us and how we shall be led.

At this time of extreme peril to our beloved way of life, it is not only the right . . . but the *duty* . . . of each of us to add our individual voice to the support of all we hold dear.

Too often, we are prone to consider our individual vote as negligible. But added together, our votes can swell into a mighty force that sweeps all opposition before it. If we think of our vote in terms of its tiny part of the picture, we are apt to put aside the slight inconvenience of going to the polls—thinking that we will take care of this matter "next time". But unless each of us casts the "X'd" expression of his wishes next month . . . the will of a determined minority will prevail . . . and there may not be a "next time".

Let's all decide, and stick to our decision with grim determination, to get out and vote for the men and issues of our choice in the coming election.

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Savings up to ⅓ on the cost of principal auxiliary equipment have been made as a result of Alco Diesel's medium speed design.

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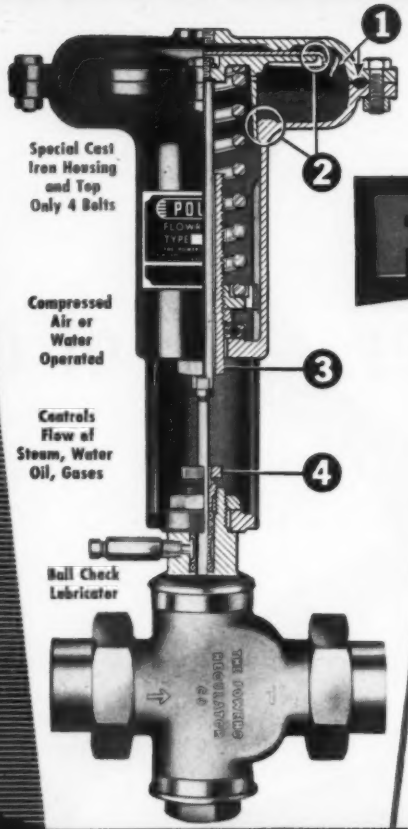

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VE TOP—Durable moulded neoprene diaphragm (1) has positive sealing bead which provides increased sealing action with increasing control pressure. Efficient diaphragm form insures ample and constant operating power thru full travel. Piston Plate Assembly (2) has a free floating thrust plate which absorbs side thrust. Closely guided piston plate maintains stem in accurate alignment.

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VARIETY of VALVE BODIES — Sizes ½" thru 8" — For line pressures below 250 psi. Rugged construction to withstand piping strains. Single seat or double seat, bronze and stainless steel trim. Double unions and flanged ends. Available normally open (direct acting) or normally closed (reverse acting) and 3-way type valves.

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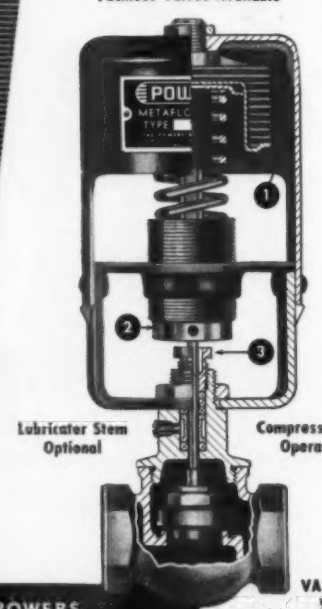

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METAFLOW NO-PAK VALVES prevent leakage of inflammable or harmful liquids or gases and provide vacuum protection. Are suitable for use with Freon, oil, gasoline, non-corrosive gases, hot or cold water and low pressure steam.

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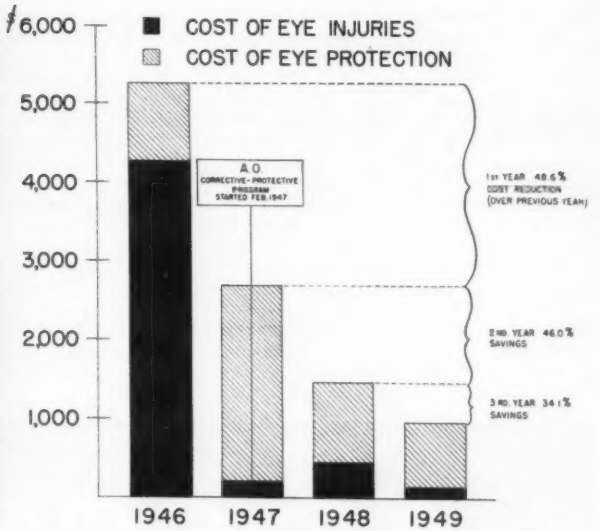

Left: Here a worker's vision is being checked for 14 basic functions with American Optical Co.'s Sight-Screener. Employes found to need their eyes examined, upon professional evaluation of the Sight-Screener record, will be referred to the professional man of their choice. Right: The cost of eye care and the savings made after Shell Pipe Line Corp., Houston, instituted a corrective-protective vision program is graphically illustrated by this chart, covering the years 1946-1949.

Shell Eyes Eye Injuries

. . . And reduces their costs 81.7 per cent during 4-year period by following program of prevention

by D. M. Farrell*

EYE injuries are painful—obviously so to the employe—and more so to management, when it is spending over $4 on each employe yearly just for taking care of injuries to his eyes.

That was the way we at Shell Pipe Line Corp. felt 4 years ago, at the end of 1946, when we found that it was costing us an average of $4.37 for each of our 1,200 employes for eye care. That year, eye injuries had cost $4,262 and, in addition, we had spent $987 for safety goggles.

We discovered that this high cost of eye injuries was due to the low cost of eye protection. Employes were not wearing the eye-protection devices that they had been furnished. If they were wearing personal-prescription glasses, the extra pair of coverall safety goggles was cumbersome and hard to keep clean, as well as not being too comfortable. For many employes in need of eye protection, but not aware of it, the plano goggles aggravated existing visual discomfort. Finally, we bought our goggles all in one size and gave very little thought to their adjustment or servicing.

Management took a bold step once it were informed of this situation. The question was: If we spend more on prevention, will we spend less on compensation and medical expense, and will the net result show a profit on the investment? To insure that worker visual comfort and efficiency plus protection would be achieved, all employes were to be checked on a scientific visual screening instrument to determine whether they needed a professional examination. It was also decided to furnish each employe found to be needing protection and who also wore glasses, with a spectacle-type goggle having lenses incorporating his personal prescription. In addition, all other employes who needed eye protection, but who did not require prescription lenses, would be furnished with spectacle-type safety goggles, individually adjusted and fitted.

To do all this, of course, we needed outside help and the industrial vision program of American Optical Co. was found after investigation to fit our needs. The operation of the program itself was placed under the direction of company physicians at each of our three area offices: Texas Gulf, West Texas, and Mid-Continent.

American Optical Co. leased us one screening instrument, the Sight-Screener, for each local area and its consultant spent a week with us installing the program. This included teaching members of our safety department, under the direction of Shell's physician, how to do the checking with the Sight-Screener and how to operate the instrument and record the results obtained. In addition, our people were also taught how to measure for, fit, and adjust spectacle-type safety goggles for those employes who did not need visual correction, but were found to need eye protection due to the hazardous nature of their work.

The main feature of the program was each employe found to need his eyes examined, upon professional evaluation of the Sight-Screener record, would be furnished the necessary corrective-protective goggles (prepared according to his doctor's prescription) by the company. This may sound as though it were a big item of expense, but it has certainly paid off. Incidentally, each employe referred for examination selected his own professional man and paid for

*Assistant personnel and industrial relations manager, Shell Pipe Line Corp.

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his examination and other services.

With the Sight-Screener, a check of 14 basic vision functions can be made in an average of 5 minutes. These functions include (at both the standard far tests or the equivalent of 20 ft. and reading distance): acuity of each eye separately and together, ability to use both eyes together, eye-muscle balance in a vertical and lateral plane, and depth perception. In addition, a simple yet basic color test was given to discover those lacking proper color discrimination.

One other important point should be mentioned. Most of our work is performed outdoors and working groups are widely separated. Hence it would have been inconvenient and expensive to bring employes into a central office for their vision check.

The Sight-Screener is portable, however, and we were able to screen each group on the spot.

The program was announced in our company magazine. The method of screening was fully explained and the means by which employes were to be furnished with eye-protection devices. In addition, posters and leaflet announcements furnished by American Optical Co. were used to gain employe cooperation. Meetings were also held with supervisors and the operation of the complete program explained in detail. Questions on the program were invited and answered concisely and fully.

Our vision-checking program got under way in the first quarter of 1947 and in a few months all 1,200 employes had been screened.

Results? We found 28 per cent of our employes had some type of significant visual difficulty! Of the total screened, 18.4 per cent were referred to vision specialists for a complete eye examination. The remainder had such defects as poor depth perception, or poor color discrimination.

We found, also, three employes with vision in only one eye—and our records had listed them as having vision in both!

Of those workers referred for further examination, more than half were already wearing glasses. Similar results can be expected in most companies as vision begins to decline nearly in middle age, usually about 40. It is at this time that bifocals are usually prescribed, for instance.

Reports immediately indicated that employes were wearing their safety spectacles and worker morale had been definitely raised because of the company's modernized program. But a company still must operate at a profit and eye-protection cost must be justified. At the end of 1947 we took a long and hard look at our expenditures and found—definite and large dollar savings!

In 1947, total eye cost had dropped 48 per cent from 1946. Cost of eye injuries had plummeted to a total of $204 from our previous $4,262. Our initial investment in a comprehensive eye-protection program was paying off! And our outlay for prevention should be much less in the following years. Would eye-injury costs remain low also?

Now, after 3 years of experience with this complete eye program—protection and correction—we have the answer to those questions and are very proud of our accomplishments.

The figures speak for themselves. In 1948, with a heavy construction program, our total cost dropped again. Cost of the program and the furnishing of protection plus the cost of eye injuries amounted to only $1,454, compared to 1947's $2,695 and 1946's $5,249. And in 1949, it was reduced still lower to $958—or 81.7 per cent below our 1946 costs! The chart shows how each year's record was a startling decline compared to the previous.

In 1949, we rescreened all employes, as 2 years is the maximum time recommended between vision checks. That this is a good rule is shown by the number—16 per cent this time, found to be in need of vision examinations.

In 1950, we estimate that our total expenditure should be less than $500. In other words, eye-care costs will be less than 10 per cent of the 1946 figure — a painful figure — for both employes and management.

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Problems encountered in

Conditioning Water for Subsurface Injection

by George G. Bernard*

THE principal objective in treating water for subsurface injection is to make it stable, substantially noncorrosive, and free of turbidity. The general procedures used in conditioning water are not discussed in this paper, since other authors at this symposium have covered this ground thoroughly. Therefore, only some very specific water-treating problems that have been encountered and their solutions are presented.

Sequestration of iron.—A fresh well water containing 1.6 p.p.m. of iron was used in a flood. The water was kept in a closed system and underwent no treatment other than filtration. However, it was found that excessive plugging of the filters was taking place. The plugging material was analyzed and was found to consist of ferric oxide, clay, and organic matter. An analysis of the water at the source well showed 0.1 p.p.m. of oxygen.

To prevent oxidation of ferrous iron, 4 p.p.m. of Calgon was injected into the annulus of the source well. To eliminate bacteria, sodium hypochlorite was added at the well head. This treatment substantially reduced the amount of deposit on the filters, and increased their efficiency of operation.

Corrosive and supersaturated water.—The data in Table 1 illustrate that untreated fresh water from another source is a calcium carbonate-depositing water. Its depositing property is demonstrated by the fact that its alkalinity is decreased by 17 p.p.m. in covering the distance between the source wells and the plant. This is due to precipitation of $CaCO_3$. Data given in the last column in Table 1 show that the water has been stabilized, since its pH and alkalinity remained almost constant in passage through the distribution system.

Corrosion has been negligible as shown by a low, constant iron content of the water and general observation of the system. The drop in oxygen content between the plant and farthest injection well illustrates that marked corrosion may have taken place in the distribution system if the water had not been deaerated.

TABLE 1—ANALYSIS OF FLOOD WATER

Test—	Source wells— No. 1	Source wells— No. 2	Water entering plant	Treated water leaving plant	Treated water at most remote input well
pH	7.4	7.4	7.5	7.3	7.3
Oxygen, p.p.m.	4.0	8.1	4.8	0.3	0.03
Alkalinity as $CaCO_3$, p.p.m.	253	251	234	217	220
$CaCO_3$ supersaturation, p.p.m.	17	16	12	2	0
Iron, p.p.m.	<0.2	<0.2	<0.2	<0.2	<0.2

TABLE 2—ANALYSIS OF BRINE FROM VARIOUS POINTS IN THE PLANT

Stage of treatment—	pH	H_2S mg./l.	CO_2 mg./l.	Alkalinity as $CaCO_3$ mg./l.	$CaCO_3$ supersaturation mg./l.
Raw brine	6.5	150	600	226	42
Brine after one aeration	7.2	50	280	198	88
Brine after two aerations	...	0.2	154	...	...
Brine after three aerations	7.5	none	62	124	30
Effluent from filters	7.5	none	32	54	8
Effluent from deaerator	7.5	none	20	54	8

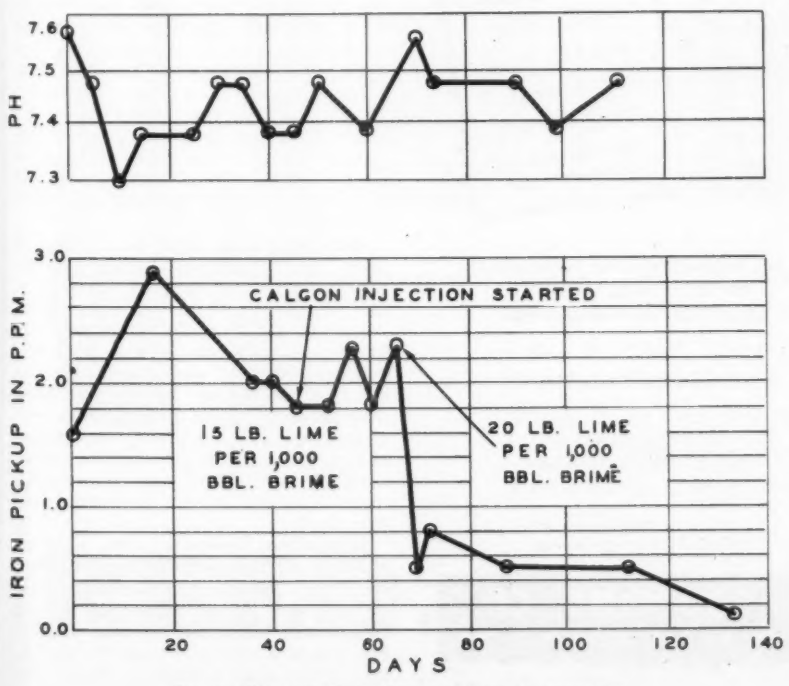

Fig. 1—Effect of pH, Calgon, and lime on corrosion.

The following four operations are performed in treating this water (1) deaeration by passage through a vacuum tower, (2) stabilization with sulfuric acid, (3) sterilization with sodium hypochlorite, and (4) filtration.

Hydrogen sulfide brine.—Arbuckle brine, containing large amounts of hydrogen sulfide and carbon dioxide was used in a water flood.

Because of its high hydrogen sulfide and carbon dioxide content, the brine was considered to be too corrosive to use without treatment. It was decided to remove the CO_2 and H_2S by aeration. However, it was found that all of the H_2S could not be removed in one aeration tower. After two aerations the brine contained 0.2 p.p.m. of H_2S. This and other data on the brine are shown in Table 2.

The aeration process removes 90 per cent of the CO_2. This accomplishes two things: (1) the brine is made less corrosive, and (2) the amount of lime

*Research and development department, Pure Oil Co., Crystal Lake, Ill. Summary of paper given at American Chemical Society symposium on "Conditioning Water for Repressuring Oil Fields and for Underground Disposal," Houston.

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TABLE 3—ANALYSIS OF FLOOD WATER

	Raw water	Alum treated water	Deaerated water
pH	7.90	7.15	7.80
pH at $CaCO_3$ saturation	7.10	7.20	7.55
Alkalinity as $CaCO_3$, p.p.m.	248	174	170
Saturated alkalinity, p.p.m.	170	182	154
Supersaturation as $CaCO_3$, p.p.m.	78	—8	16

TABLE 4—ANALYSIS OF DEPOSIT FROM CENTRIFUGAL PUMP

% MnO_2	% Al_2O_3	% Fe_2O_3	% SiO_2	% CaO	% Loss on ignition
47	17	Trace	2	7	27

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4.88	2.09	1.98	90.7	....	....

necessary to stabilize the brine is decreased.

It is also interesting to note that even though the aeration process removes acidic CO_2, the alkalinity of the brine decreases. Apparently, when the CO_2 is removed $CaCO_3$ is formed and being highly insoluble falls out of solution as shown in the following equation:

$$Ca(HCO_3)_2 \rightarrow CO_2 \uparrow + H_2O + CaCO_3 \downarrow$$

After aeration, the brine was flocculated with lime, chlorinated, filtered, and finally deaerated. The condition of the brine at various points in the plant is shown in Table 2.

Effect of vacuum on stability of $CaCO_3$.—A flood water was treated with lime and alum, filtered, and finally deaerated. However, in the deaeration process the water was made unstable. Merely by application of vacuum an undersaturated water was made supersaturated (see data Table 3). The reduced pressure markedly raised the pH and $CaCO_3$ supersaturation. Apparently the vacuum was pulling carbon dioxide out of the water. This difficulty was eliminated by addition of sulfuric acid to the deaerated water and was found to be an economical and easy control method of stabilizing a supersaturated water.

Chlorination problem.—In a certain treating plant the water was first chlorinated, then settled in a basin, and filtered. The settling basin was of such size that the water remained there for 3 days on an average. To maintain a chlorine residual for 3 days, very large amounts of chlorine were required and to save chlorine, the chlorinator was placed between the settling basin and the filters. This change substantially reduced the chlorine requirement. However, a few months after this change was made, large deposits of a black substance formed on the sand filters and the centrifugal pump. This material impaired proper filtration and operation of the pump. It was analyzed and found to have the composition shown in Table 4.

Because of the high percentage of MnO_2 present in the deposits, the water was analyzed and found to contain about 0.1 p.p.m. of manganese. Apparently, the precipitation of manganese dioxide was caused by addition of chlorine, which oxidized the soluble manganese ion to insoluble manganese dioxide. This trouble was eliminated by chlorinating the water before it reached the sedimentation tank. In this way the manganese dioxide settled out in the sedimentation tank.

Mitigating corrosion.—In another project produced brine was treated with lime and alum, chlorinated, filtered, and then deaerated. Even though the brine was deaerated, and the pH was in the range 7.3 to 7.6, the brine was corrosive. This was shown by the fact that the iron con-

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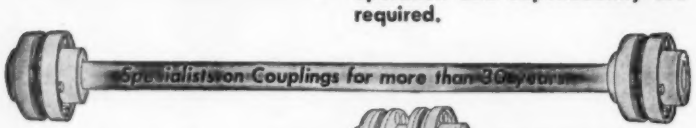

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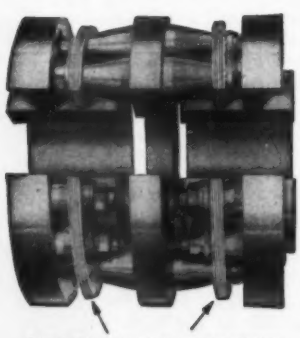

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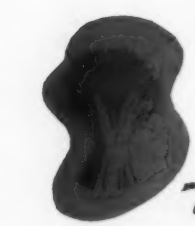

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TABLE 5—ANALYSIS OF BROMIDE AND OIL CREEK BRINES
(In mg./l.)

Brine—	pH	Fe	H_2S	Alkalinity as $CaCO_3$
Bromide	5.0	30	none	68
Oil Creek	6.9	none	211	500

TABLE 6—ANALYSIS OF BRINES
(In mg./l.)

Component—	Pennsylvanian	Bromide
Strontium	Trace	Trace
Barium	None	210
Sulfate	845	None
Calcium	...	2,350
Bicarbonate as $CaCO_3$	184	430
pH	6.7	6.9

tent of the brine at the remotest injection well was 2.0 p.p.m. greater than at the plant.

To combat corrosion, the brine was made 15 to 30 p.p.m. supersaturated with $CaCO_3$ and 2 p.p.m. of Calgon were added to the brine. As is evident from Fig. 1 this treatment did not decrease corrosion, since the iron pickup remained at about 2.0 p.p.m. Next the lime feed was increased from 150 to 200 lb. per 10,000 bbl. of brine. At once the iron pickup was diminished and finally reached a value of 0.1 p.p.m., about one-twentieth of its original value. It is interesting to note that addition of more lime raised the pH very slightly, yet had a marked influence on the corrosion rate.

Incompatible brines. — In another case, it was necessary to handle two brines in one system. The brine from the Bromide formation had 30 mg. per liter of ferrous iron, while the brine from the Oil Creek formation had 211 mg. per liter of hydrogen sulfide. This is shown in Table 5.

Of course when the two brines were mixed, large amounts of ferrous sulfide were formed. Fortunately the ferrous sulfide was in colloidal state and did not settle out in the lines. On addition of lime and alum, the ferrous sulfide coagulated and settled out in the settling basin.

In another field, the lines of the brine-disposal system were being coated with a deposit containing substantial amounts of barium sulfate. A mixture of Pennsylvanian and Bromide brines was being passed through the system. The brines had the composition shown in Table 6.

The formation of barium sulfate can be prevented by keeping the two brines separated.

Conclusion

In conclusion, this has been a presentation of some experiences that we have had in conditioning a number of typical oil-field waters for subsurface injection.

Acknowledgment

The author wishes to thank the personnel at various water-treating plants of Pure Oil Co. for their kind assistance in obtaining the data presented in this paper.

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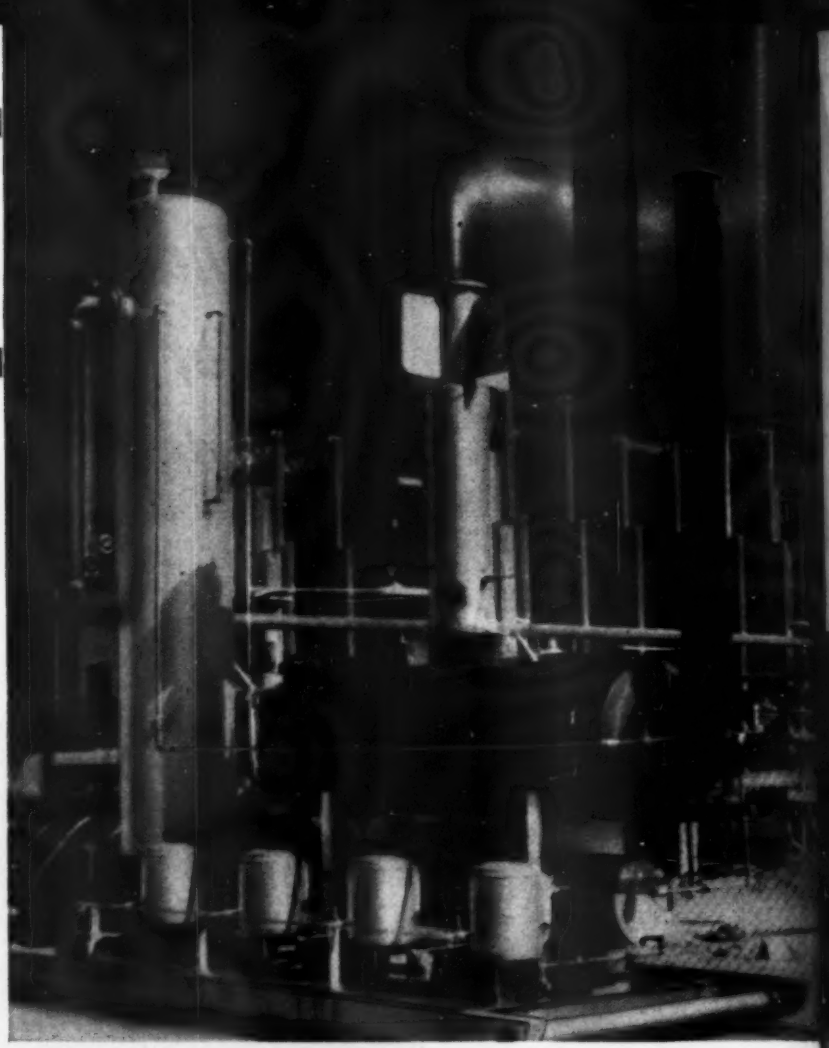

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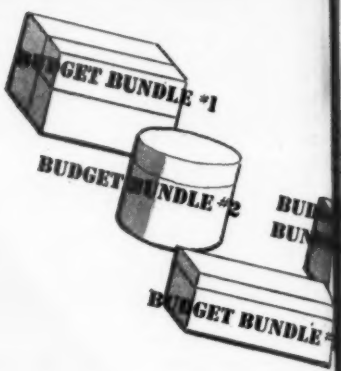

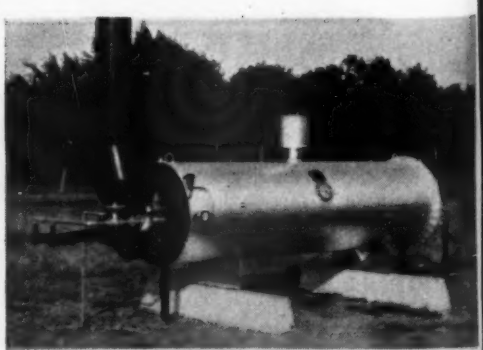

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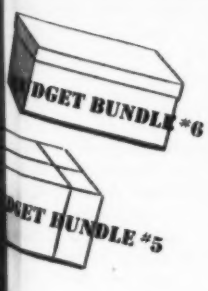

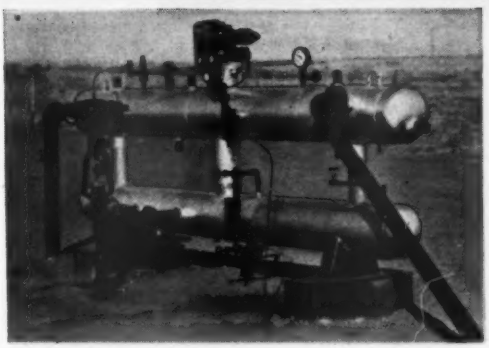

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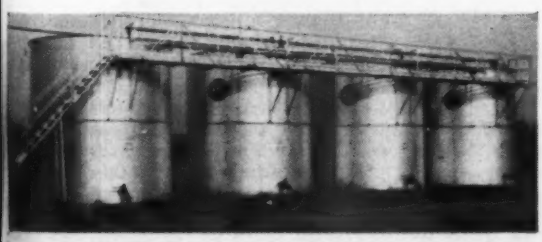

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Much Geological and Drilling Work Remains in Search for Oil in Pakistan

by Dr. H. Crookshank*

AS the oil areas in Pakistan, both actual and potential, are all in different stages of development, the whole area has been split into six zones, in each of which the search for oil is in the same state of advancement. These are:

1. The Punjab and the North West Frontier provinces.
2. Eastern Baluchistan.
3. Western Baluchistan.
4. Sind.
5. The Indus Valley.
6. Eastern Bengal.

The Punjab and the North West Frontier Provinces

Attempts to develop oil near seepages began in the Punjab about 1870, and continued intermittently till 1900, when they were given up as a failure. Undismayed by this, Attock Oil Co. was formed in 1913 to prospect for oil on scientific lines. Two years later it drilled into an anticline near Khaur, and proved the presence of oil in workable amounts at several horizons from the Siwaliks to the Eocene limestones. After the 1914-18 war they built a refinery near Rawalpindi, and joined it to Khaur by a pipe line.

Discovery of Joyamair.—Khaur oil field proved "patchy," and wells which originally gave high yields rapidly declined. This forced Attock to drill more test wells. In 1935, helped by improved drilling technique, it found oil in Eocene limestone below some 8,000 ft. of Nimadric sediments in a structure at Dhulian. This made it possible, in spite of the gradual exhaustion of Khaur, to work up to the high wartime production of 885,780 bbl. in 1941; thereafter production fell gradually.

The company then obtained government permission to resume the test drilling which had been stopped at the outbreak of the war, and with this help sunk wells at Uchchri, Meyal, and Joyamair. The first two failed, but at Joyamair a black stream of hot oil gushed out from a depth of about 8,000 ft. Unfortunately, on cooling, this oil hardened and could not be pumped. It has a composition of about 70 per cent bitumen and 30 per cent light oils, with no middle fraction.

Discovery of Balkassar.—In 1945 oil was discovered by the same company in a rather large geological structure at Balkassar, not far from Joyamair. This oil is also black and is less valuable than the green oil of Khaur and Dhullian, but it can be pumped to the refinery. As at Dhulian, it is derived from fissures in the Eocene limestone. Accordingly, the yields of wells are very capricious, varying from 10 to 10,000 bbl. a day.

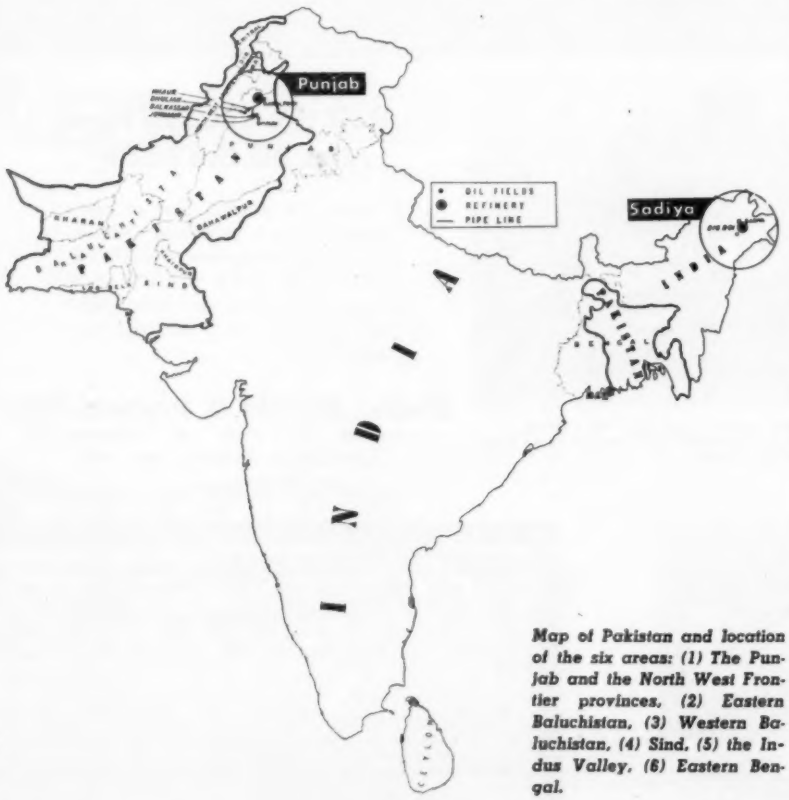
Burmah Oil Co. is also drilling two development wells in a part of Balkassar field which falls within its lease. After overcoming many difficulties owing to exceptional flows of water, one of these wells has reached production. In the first flush as much as 2,000 bbl. a day was recovered.

The only test well now being drilled in the Punjab is at Meyal, not far from the dry well sunk there during World War II. The company geologists affirm that oil is present. The difficulty in finding it is due to a major fault which has displaced the structure below ground.

Future oil exploration.—For the future, there are still a number of potentially oil-bearing structures in the Potwar, which have not yet been drilled. There are also several shallow structures concealing Cambrian rocks along the margin of the salt range, where a test well is to be put down in the near future; there are also several salt domes in the Eocene formation of Kohat which are now being given a detailed investigation in preparation for drilling.

The recent geophysical survey of the Potwar, undertaken on behalf of Burmah Oil Co., showed two structures in depth which were not reflected in the surface rocks. These will be drilled in due course. If success is attained, these test wells will be of considerable importance, as it is quite possible that there are other hidden structures in the Punjab at depths capable of being reached by drilling.

The oil fields so far discovered approach exhaustion after a yield of about 5,000,000 bbl. They are costly to



Map of Pakistan and location of the six areas: (1) The Punjab and the North West Frontier provinces, (2) Eastern Baluchistan, (3) Western Baluchistan, (4) Sind, (5) the Indus Valley, (6) Eastern Bengal.

*Director, Geological Survey of Pakistan. Paper presented at Fourth World Power Conference, London.

find and to exploit, and the average oil is of poor quality.

The financial results have yielded less than 3 per cent to the successful company and a dead loss to all others. Against this must be put much experience which may help in finding new oil fields in the future.

Provided that the financial returns justify the expenditure on drilling and exploration, there is every hope that, for many years to come, further small oil fields will be discovered as fast as old ones become exhausted.

Oil in Eastern Baluchistan

In Eastern Baluchistan there is a series of rocks from Trias to Eocene very similar to that in the Punjab salt range. Above this, the Nimadrics are rather more marine than those of the Punjab, but they are essentially similar.

The government succeeded in producing about 2,000 bbl. of oil in the 1870's, from wells drilled to 500 ft. near seepages from the lower Eocene at Khattan in the Bugti area. This at least proves the presence of oil.

Political difficulties. — Since those days, geological investigation has been active, and Burmah Oil Co. has located several promising structures in the Nari-Bugti region and near the Bolan River. It has never been able to test these structures, owing to the difficulty in undivided India of obtaining oil leases in tribal areas.

Until drilling has been tried, future prospects must remain uncertain, but geologists look with reasonable confidence to the ultimate discovery of several small oil fields in this area.

Oil in Western Baluchistan

Geology. — Western Baluchistan is blanketed by a great thickness of Khojak shales. These occasionally contain marine Miocene fossils. They are frequently tightly folded and puckered, and sometimes are metamorphosed to phyllites. In places, Eocene rocks can be seen underlying them; but sufficient geological work has not yet been done to enable one to state whether these, too, are tightly folded or lie in gentle folds beneath the Khojaks.

Numerous mud volcanoes occur along the Mekran coast of Western Baluchistan in elaborately folded Khojaks. Whether the gas which gives rise to these mud volcanoes comes from the Khojaks or underlying rocks is not yet known, nor can it be stated whether there are suitable structures underlying the Khojaks where oil may be trapped.

Shallow prospecting wells were drilled in 1920 along the Mekran coast, not far from Karachi. These met with much gas but no oil. As they never penetrated the Khojaks, they have proved little.

Difficulties.—Over a very large part of Western Baluchistan the only topographical map is an old one drawn to a scale of 1 in. = 4 miles. This has made detailed geological surveys of this area very difficult. Geological work has also been retarded by the waterless nature of the area, the sparse—often nomadic—population, the absence of roads and railways, and the local belief that geologists only come to rob the country of its gold.

Without an adequate geological survey, followed by a suitable program of test drilling, it is quite impossible to say whether oil will be found in Western Baluchistan; but the presence of a folded Tertiary succession, and numerous mud volcanoes, certainly justify a much more careful investigation of the area than it has so far received.

Oil in Sind

Sind contains a thick series of marine sediments, from Jurassic to late Tertiary, folded into structures suitable for the accumulation of oil.

Geology.—The Mesozoic rocks exposed along the Baluchistan border are oceanic sediments deposited in the bed of the Tethys. Shallow-water marine sediments of similar age occur east of the Indus Valley in Jaisalmere and Jodhpur. Somewhere between them, it is believed that there must have been a zone of Mesozoic estuaries where the conditions for the development of petroleum would have been ideal, and where it may subsequently have accumulated under a thick cover of cretaceous shales.

Lakhra is a large structure in this supposed estuarine tract; accordingly Burmah Oil Co. has commenced a test well there in the hope of finding a major oil field. So far it has penetrated about 8,000 ft. through Eocene limestones, Deccan Trap, and Cretaceous shales. A little gas has been met in the more porous Cretaceous beds, but no oil. As the company is prepared to drill 4,000 ft. deeper, it is impossible to say what the ultimate result of this well will be. Should success attend this daring gamble, the prospects of Sind becoming a great oil producer would be rosy, for there are other similar geological structures in the same zone.

So far, oil has not been found in the lower Eocene rocks of Sind, though test wells in Khairpur and elsewhere have been drilled.

Miocene oil may also occur in southern Sind where there is a thick series of marine and estuarine sediments of that age. These rocks have been folded into suitable structures, and may well contain oil fields, as do the rocks of that age in Burma. So far, drilling in these rocks has been confined to search of geological information.

It is remarkable that, in spite of the presence of a thick Tertiary and Mesozoic succession folded into suitable structures, no oil has yet been found in Sind. This is certainly not due to adverse political conditions or to a lack of oil companies interested in the area. One fears that, in spite of favorable appearances, no oil has accumulated in Sind.

Oil Under the Indus Valley Alluvium

East of the Indus Valley the Eocene rocks lie horizontally and form no suitable oil traps; to the west they have been entangled in the Himalayan folding, and in most cases have been too tightly squeezed to contain much oil. Somewhere below the alluvium between these extremes it should be possible to find ideal folds where oil might have accumulated in large amounts. Such folds could only be sought by geophysical methods.

Geophysical investigations. — Accordingly, just before the war, two large oil companies commenced a geophysical investigation of the Indus Valley alluvium. The first survey undertaken was a gravity one. This was almost complete when oil prospecting was stopped on account of World War II. One company never resumed the work, but the other found some small anomalies which it decided to investigate by seismic methods.

The results were completed during 1948, and proved so disappointing that almost all prospecting licenses in alluvial areas were immediately surrendered. They showed that the Nimadric sediments underlying the Indus alluvium may be as much as 30,000 ft. thick along the mountain margin of the valley. The rock underlying the Nimadrics rises very gently to the east, till it reaches the surface in the Bikaner Desert. No folds or other interesting structures were found. There seems, therefore, to be no hope of finding oil below the Indus alluvium.

Oil in Eastern Bengal

Protruding from the Gangetic alluvium are a series of low ridges increasingly tightly packed as the eastern borders of Bengal are approached. The general structure of these ridges is anticlinal, the wide intervening valleys are synclinal.

The rocks consist of fine sandstone and clay, deposited by some predecessor of the Brahmaputra. The few fossils found are poorly preserved and of little stratigraphical value. They appear to be estuarine.

In spite of the thickness of the jungle, the oil companies have made a geological map of the area by making traverses and filling in the gaps with the help of aerial photographs. The rocks belong to the Sulhet sandstones and the Surma series of Miocene age. They are many thousands of feet thick.

Presence of oil. — The anticlinal structures more or less suitable, since oil traps, oil seepages, and gas shows are common. The Badarpur oil fields in the Surma Valley formerly yielded nearly 2,000,000 bbl. of oil. There has also been much drilling in search of geological information near Masimpur, so that there is a considerable mass of knowledge on which to base future oil exploration.

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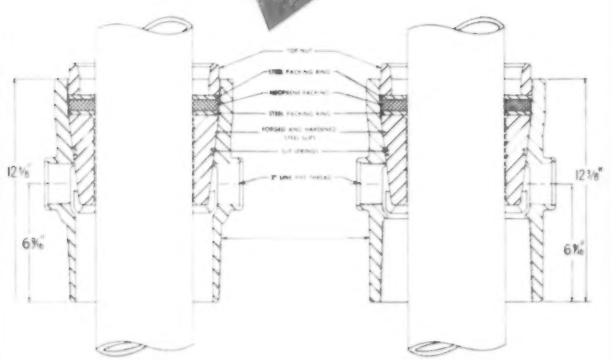

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ROTARY PERCUSSION DRILLING

. . . a review and a prediction

by Ross Bassinger

ONE of the most powerful natural forces is vibratory shock or percussion. The application of this form of energy to making bore holes in the earth has an honorable history, a considerable current practice, and a tremendous future potential.

It is well known that in early times the Chinese utilized percussion in a crude way for making wells. Ask any rope choker about the good old days. Today, the modern jackhammer is highly effective in the quarry and mine.

In the petroleum industry, the giant strides made possible by rotary digging relegated percussion to the sidelines for a long time. The best drilling brains were concentrated upon improvements within that general technique. In recent years, however, attention also has been directed toward utilization of percussion. One reason for this development is the increased consciousness that the practical ceilings for rotary drilling efficiency are being reached. Many improvements are of course possible, but they are in the nature of refinements only.

Another reason for the interest in percussion is that deeper oil-producing horizons and increased drilling costs make it readily apparent that more efficient means of reaching our reserves are necessary if the cost of petroleum products is to be kept within economical bounds. Recognition of this problem has been given by a substantial portion of the oil industry in the formation of Drilling Research, Inc., to investigate entirely new methods of digging. However, the proven practicality of percussion in quarrying and mining plus its oil-industry background made it natural that several majors as well as independent developers would turn to percussion for a frontal attack on drilling economies. In particular, this has taken the form of retaining the inherent advantages of rotary drilling and adding the known advantages of percussion.

Perhaps the most important reason of all for the spreading attention to percussion has been the development of a tool which can, in conjunction with standard rotary equipment and action, deliver percussion energy to the bottom of the hole. Theorizing about percussion was interesting but not until percussion became a practical reality in holes being drilled for oil did it begin to spark the imagination of oil men. To discuss was one thing; to "percuss" was another.

Some form of percussive energy in combination with a cutter will penetrate specific formations at accelerated rates. Efficiency is limited only by the horsepower utilized. Proofs of this belief have been demonstrated since a practical percussion device has been available for test drilling. The most noteworthy performances have been in brittle shales as well as cherty formations where penetration rates and bit life of 300 to 1,000 per cent improvement over conventional means are recorded.

Utilizes Existing Equipment

After study of many possible forms, it was decided that a device which could use the present rotary mud system as an energizing medium would be superior for several basic reasons. First, it would utilize existing equipment. Second, it would permit retention of the developments of mud technology, such as cuttings recovery and hole conditioning. Third, it would solve the problem of delivering power at the hole face and moving it down as digging progressed.

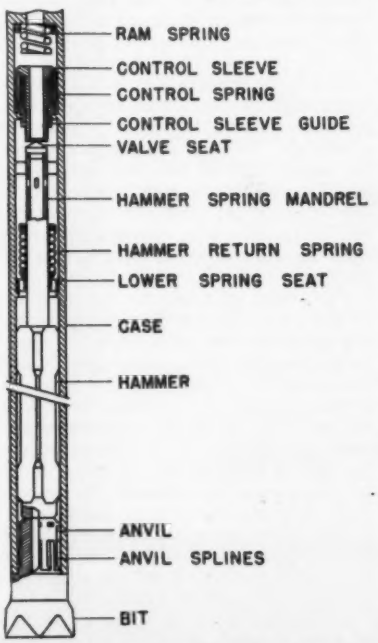

Diagram showing arrangement of the principal components of the Bassinger tool.

The author has been associated with the drilling industry for more than 20 years. Since early 1940 he has worked in the development of percussion-drilling equipment. The tool described in this article was invented by Bassinger and has been developed with the assistance of several oil companies and other organizations. Bassinger lives in New Braunfels, Tex.

In a general way these requirements have been fulfilled by the Bassinger drill.* This drill has been in usuable form for over 2 years and in its latest improved form for 8 months. The early models, while being used to determine their drilling value, also served to isolate and cure operational bugs. Erosion due to high-velocity drilling fluid, as might be expected, was the most troublesome of these.

The present model, as well as the earlier models described in previous articles, uses the mud stream to energize a reciprocating bar or hammer in the downward direction, and a spring to return it. The hydraulic pressure induced when a valve is closed (one element of the valve is the hammer itself) causes the hammer to travel at relatively high speed and strike an anvil to which a bit is integrally attached.

The Bassinger drill is in essence a mud engine. It is capable of delivering percussive energy to a bit and thence to the formation, over sustained runs of many hours' duration, without disproportionate wear even in abrasive sand conditions. It can be readily dressed at the rig and is not complicated to operate. It has made many thousands of feet of hole and has been on bottom many hundreds of hours. It is readily adjustable as to power per blow and as to frequency of blows (from 300 to 1,800 per minute).

A proved, practical mud engine is, however, not enough. To make it an oil-industry tool of widespread application, two general problems must

*See The Oil and Gas Journal, March 17, 1949, page 182 et seq, and November 10, 1949, page 305 et seq.

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be tackled on a much broader basis than heretofore. First, there is much work to be done in finding the right combination of power per blow, frequency of blow, type of bit, amount of preloading, rotary speed, and pump pressure—all as related to the formation being drilled. The answers to these problems are to be found only at the bottom of the hole.

Development Work

Much bit-development work has been done and is being done. Most percussion drilling so far has been done with roller bits to define the benefits of adding percussion to rotary drilling. However, present roller bits, even when beefed up and made with journal bearings, are not strong enough to receive the impact forces which the mud engine can deliver and which are necessary to do the greatest possible good with percussion. Further improvements are being made to strengthen them so that greater energy can be applied.

The conventional roller bit does lend itself to rotary percussion drilling with high-frequency, light blows. Many runs on this basis have shown increases in performance over conventional drilling in some formations. In almost every case it has been possible to compete favorably with conventional drilling while using very light weight. This has proved valuable in areas where it is difficult to drill straight while using weight.

Bits must be able to withstand both the rotary and percussion actions and also be able to take advantage of them. The amount of work done is in proportion to the amount of useful horsepower delivered to the formation. The cutter needs to be of such design that it can transmit the energy in effective form to the formation being drilled. It is of course possible to protect the bit and still transmit a great amount of horsepower by increasing the frequency of blows and decreasing the power per blow. However, low unit blow energy results in ineffective drilling action unless it is sufficient to fracture friable strata, or unless the cutter is sufficiently sharp to penetrate. It is recognized that some adjustment of horsepower to bit strength may always be necessary to insure longer bit life, especially in hard formations. But at present the limitations imposed by the bit are far too great.

The solid type of bit, which is structurally stronger and therefore capable of transmitting greater energy, will undoubtedly receive more attention in the future. It may be particularly efficacious in those formations which are readily penetrated with percussive action only. In this case the drill string need be rotated only to index the cutter, whereas in combination drilling part of the work is done by rotation and part by percussion.

A program is contemplated using percussion with the recently developed high jet bits. Any formation on which a fishtail could be used efficiently would in all probability not be very friable. In that instance the cutter would be driven into the formation and rotation would pry the bite loose instead of lathing it from bottom. This action should contribute to longer bit life and under some conditions actually tend to sharpen the cutter.

In summary as regards bit-development work to be done, bits must be made more durable so that the power per blow does not have to be seriously lowered. Some formations yield readily to the light, fast blow which present conventional bits can withstand. However, to maximize the gain from percussion, more power per blow is needed in most formations. Five manufacturers have produced special bits to achieve this goal, some of which have considerably more than passing promise. Some rather startling developments along this line may be expected in the near future.

Determining Right Combination

The second general problem is determining the right combination of the various factors in relation to the formation being drilled. This is an empirical problem. These factors include: (1) power per blow, (2) frequency of blow, (3) type of bit, (4) amount of preload, (5) rotary speed, (6) pump pressure, and (7) weight of hammer.

Already a substantial body of data is at hand based on work in drilling areas located from New Brunswick, Canada, to the Mexican border. At times, performance has run off the top of the chart; at times, it has been disappointing. There is no way to get the answers except to have at it.

It is not expected that all formations will show better drilling performance with the same application of energy. Neither is it expected that the same kind of bit will suffice for all. The adjustment of percussion to the drilling of different formations can be hastened by cooperative study with an exchange of information for the benefit of all.

Variations of hammer weights, velocities, and frequencies are now being studied with different bit types in combination with rotary speeds and bit preloads to ascertain the most efficient practice for a given formation. As indicated, some outstanding results have been obtained; but the conditions are so varied that much more work will be needed to evaluate them properly. Enough facts have been established to insure that the approach is good. The peaks of performance when the right combinations are used inspire even greater effort.

In predicting, it is wise to realize that percussion will occupy a basic and widespread role in digging holes for oil, but it is unwise to specify what method or methods will be utilized to achieve percussion action at the bottom of the hole.

Percussion drilling in general has made the greatest strides in the past 3 years when a practical device was available for study, which is proceeding at an accelerated pace. Even when the art is reviewed to any great extent one finds that comparatively little is known about it. Obviously the method holds promise to the drilling industry since definite advantages have been conclusively demonstrated in recent work.

While the Bassinger drill in its present form represents a device for delivering percussion energy to the hole face, there are of course other possible ways to accomplish the same objective. Examples are utilization of the hydraulic shock wave to deliver energy primarily directly to the bit, creation of waves of energy in harmonic rhythm to elongate a bar or drill collar to which a bit is attached, elevation of the bit off bottom and driving or dropping it onto the formation, etc.

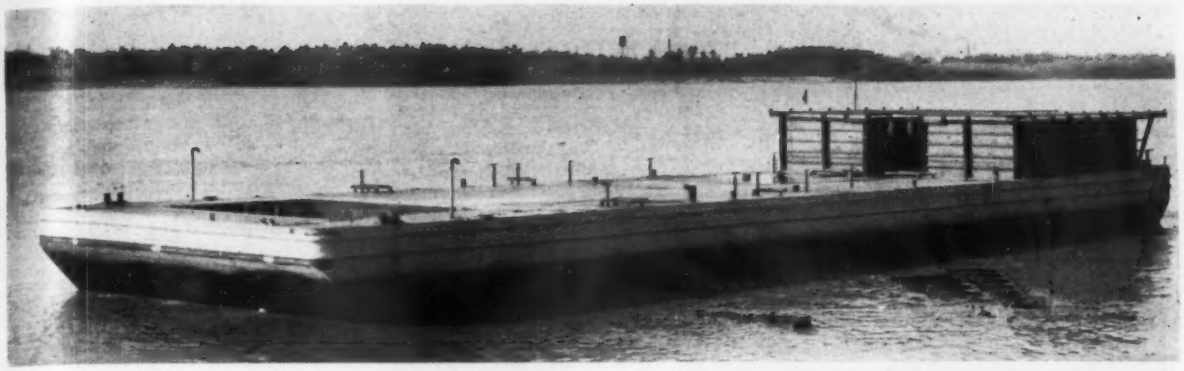
Ultimately some changes in conventional rig equipment may prove desirable for this type of percussion drilling. For example, if greater horsepower yields commensurately greater results, larger pump capacities would clearly be indicated. All work to date has been done with conventional pumps, and volume and pressure have been well within rated capacities. This may always be quite sufficient, but pump manufacturers should be alert to the demands that may be made upon them when, as, and if greater volumes and pressures are indicated to maximize the benefits of rotary percussion.

In areas where the formations are harder and more friable the conventional digging rates are slower. These are the areas where the drilling costs have shown the highest increases and therefore should have the most attention. Here, percussion drilling would seem to have its greatest potential.

Excessive drill-collar weights will not be needed in straight percussion drilling, neither will high rotation speeds. Thus the drill-string life will be increased and maintenance costs reduced. This in itself could help eliminate pipe shortages such as experienced in World War II. This possibility alone will induce more investigation.

Acknowledgments

The following organizations and individuals have contributed greatly toward percussion-drilling study: Shell Oil Co., Stanolind Oil & Gas Co., Humble Oil & Refining Co., Atlantic Oil & Refining Co., Slick-Urschel Oil Co., Magnolia Petroleum Co., Bassinger Tool Co., Hewgley Drilling Co., Mountain States Drilling Co., Olsen Drilling Co., Hughes Tool Co., Reed Roller Bit Co., Ingersoll-Rand Co., Chicago Pneumatic Tool Co., Southwest Research Institute, Institute of Inventive Research, Robinson Brown, J. M. Hewgley, Sr., and Tom Slick.



Hull of diesel-electric barge of Rowan Drilling Co., Inc., Fort Worth, is shown here as "launched," preliminary to equipment installation.

Rowan's New Drilling Barge Designed for Economy of Operation

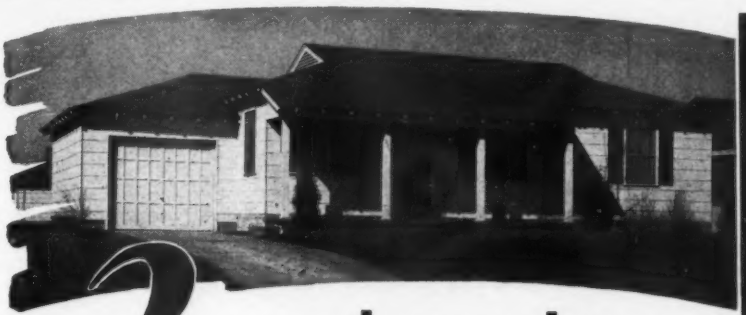
ONE of the largest drilling rig barges designed for inland waters was recently launched at the River Plant of Avondale Marine Ways, Inc., of New Orleans. Built for Rowan Drilling Co., Inc., of Fort Worth, the barge, 200 ft. long, 54 ft. wide, and 12 ft. deep, slipped into the Mississippi River exactly 1 month after the contract was signed and orders to proceed with construction given.

M. G. Rowe (or Drill Rig. No. 14) is the name given this giant drilling rig by Rowan. It is a completely self-contained unit, with drilling equipment and power supply located on the same barge. Designed for economy of operation, all phases of work necessary for successful drilling have been carefully worked out by Rowan and Avondale engineers and so designed as to eliminate costly and unnecessary effort

Electrically Operated

The rig is electrically operated with power furnished by its own generating plant. This plant consists of one 8-cylinder, 650-hp., Superior supercharged engine driving a 400-kw. Westinghouse generator and four additional 6-cylinder, 300-hp., Superior supercharged engines driving four 200-kw. Westinghouse generators. These diesel engines are the type that can be quickly converted to natural-gas fuel, anytime the drilling location is near a gas field, thereby effecting a large saving in fuel costs. Provisions have been made for installing an additional 400-kw. generating unit at a later date. This power is augmented by an auxiliary electrical plant totaling 190 kw. for lighting, auxiliary pumps, and sundry usage.

The electric-driven draw works is an Emsco ECA-54, capable of drilling 15,000 ft. plus. Mud is supplied by three large pumps, a National E-700 driven by an 800-hp. electric motor and the other two National C-350



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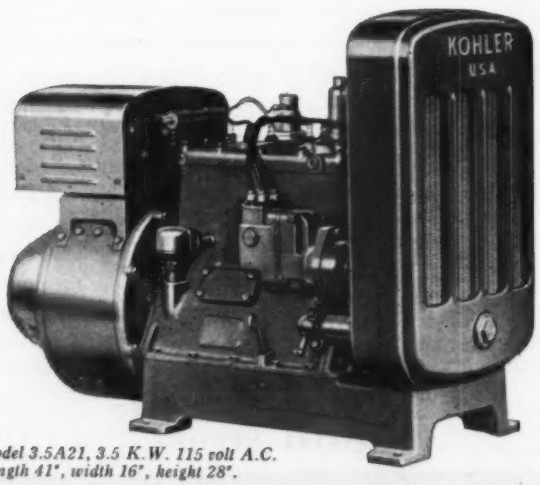

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Design Details of Drilling Barge

Structurally the barge is designed to stand hard service. Bottom and sides are of ⅜-in. plate, with ½-in. thick plate on the sides above the 5-ft. water line. The main deck under the drill floor is also ½-in. plate. The main deck slopes toward the slot (or center of barge) so all drainage can be controlled. The deck of the reserve mud pits slope toward the slot also for efficient cleaning.

The heavy substructure is completely galvanized and designed to provide ample room for handling heavy equipment. There is 14-ft. clearance under the rotary beams, with the drill floor 19 ft. 8 in. above the main deck. An unusual feature is the 33-ft.-square area on the main deck, with a 14-ft. clearance uninterrupted by trusses.

The engine house is 48 ft. wide, 45 ft. long, with a 13-ft. wall height. There is a 5-ton crane running the entire length of the engine house. Pumps are housed in a room 44 ft. long. 48 ft. wide, with 10-ft. clearance. Quarters consist of a change room, office, laboratory, galley, and visitors' room.

The substructure is designed for a standard 30-ft. base, 136-ft.-high derrick—or it can also use a 33-ft.-base derrick 150-ft. high capable of withstanding a 100-m.p.h. wind with 70 stands (6,300 ft.) of drill pipe. The entire structure will carry a load of 1,500,000 lb., with a rotary load of 600,000 lb. and a setback load of 400,000 lb.

Another Rowan rig, No. 13, is now drilling in Timbalier Bay, Louisiana. It is a very powerful diesel-electric-driven drill rig. Rig. No. 13 has a total capacity of 1,845 kw. and is capable of drilling to a depth of 18,000 ft. plus. It also was constructed by Avondale.

BOOKS

PROCESS HEAT TRANSFER. By Donald Q. Kern. Published by McGraw-Hill Book Co., 330 West Forty-Second Street, New York. 871 pp. $8.

This book is a new type of undergraduate and graduate text affording systematic instruction in the calculations, derivation, and empirics of heat transfer using the language and methods of industry. The fundamentals of heat transfer are developed within the actual equipment and flow patterns in which it occurs in the majority of industrial operations. All calculations are treated as interrelated occurrences between hot and cold agents through a single surface, thereby increasing the student's facility with trial-and-error calculations from the outset. The text combines both theoretical background and modern practice. In fact, the volume is a relatively complete manual for solving the problems of thermal design arising in the process industries.

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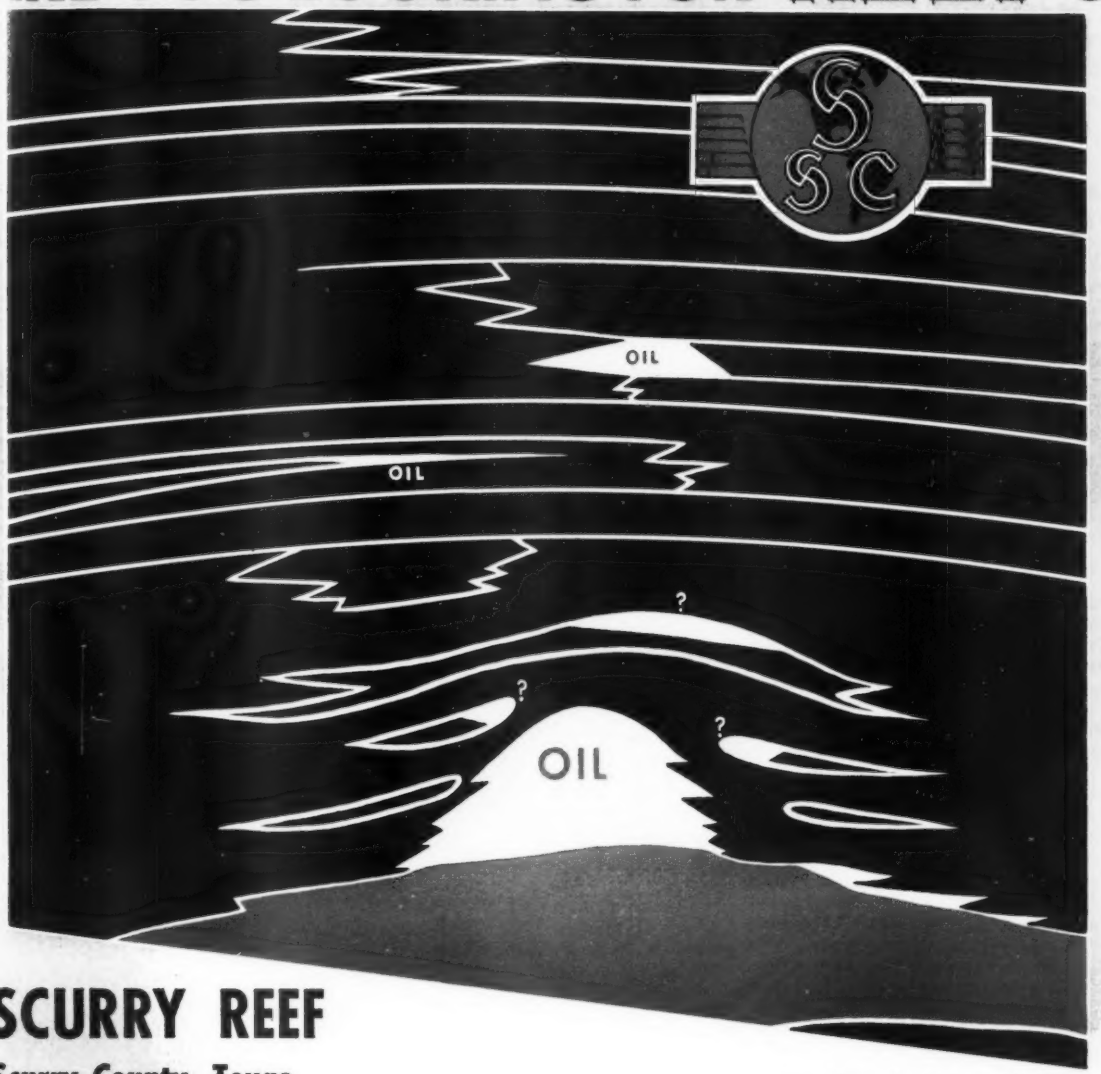

SCURRY REEF

Scurry County, Texas

The above sketch is an idealized conception of the general geologic features.

This is a fairly broad, elongated oil-bearing reef (possibly of the barrier type) of Lower Pennsylvanian (Canyon) age. Oil accumulation in the main reef is unusually rich. Some oil also occurs in up-dip fingers near the base of the reef, below the water level of the main accumulation.

The top of the reef is quite irregular with as much as 500 feet of relief between offset wells.

Additional oil accumulations have already been found in draped beds above the main reef, and others may be found. Structural interpretation of draping in the upper formations is complicated because of the persistence of lateral facies transition zones through a substantial part of the critical vertical section.

SSC Recommends the Following Approach for Seismic Reef Exploration

No. 1. COMPLETE GEOLOGICAL AND GEOPHYSICAL CO-ORDINATION

Abnormal subsurface conditions may be expected in the vicinity of organic reefs. For this reason, complete geological and geophysical co-ordination, both in the field and in the home offices, is required to resolve properly the seismic data. SSC emphasizes that such a policy is one of the PRIME REQUISITES of a successful reef exploration program.

(This is one of a series)

Seismograph Service Corporation

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Instruments for

Pipe-Line Pressure-Surge Studies

by F. O. Stivers*

Here's a discussion of the types of instrumentation available, and advantages and shortcomings of each

A PIPE-LINE company's first interest in the hydraulic pressure surges of oil lines is usually brought about by the repeated failure of main lines or station piping. In many instances where excessive surges are present in station piping, the pump valves are short lived or fluid bodies are broken. The recent work of a joint committee on long-line pressure surges is evidence of the interest that the oil industry is taking in such studies.†

In the study of pressure surges in piping it is necessary that the observer be furnished with fairly accurate records of the changes in over-all system pressures in respect to a time base. The extent of tests and accuracy needed depends, of course, on the results desired.

A knowledge of pressure surges is of importance not only to oil-pipe-line companies but to a large cross-section of industry where problems range from the high-frequency, high-magnitude surges found in diesel-fuel injection piping to the lower-frequency water-hammer pressures of penstocks. Compressible gases enter the pressure pulsation picture in gas pipe lines and compressor stations. The instruments discussed in this paper are concerned primarily with the pressure surges in oil lines and pump-station piping, although applicable to or previously used in similar work on other piping systems.

*Humble Pipe Line Co. Presented at A.S.M.E. Petroleum Mechanical Engineering Conference, New Orleans.

†"Final Report of Joint Surge Conference," covering field investigations on oil pipe lines conducted during 1949, sponsored by: Middle East Pipelines, Ltd., Trans-Arabian Pipe Line Co., Gulf-Shell Pipe Line.

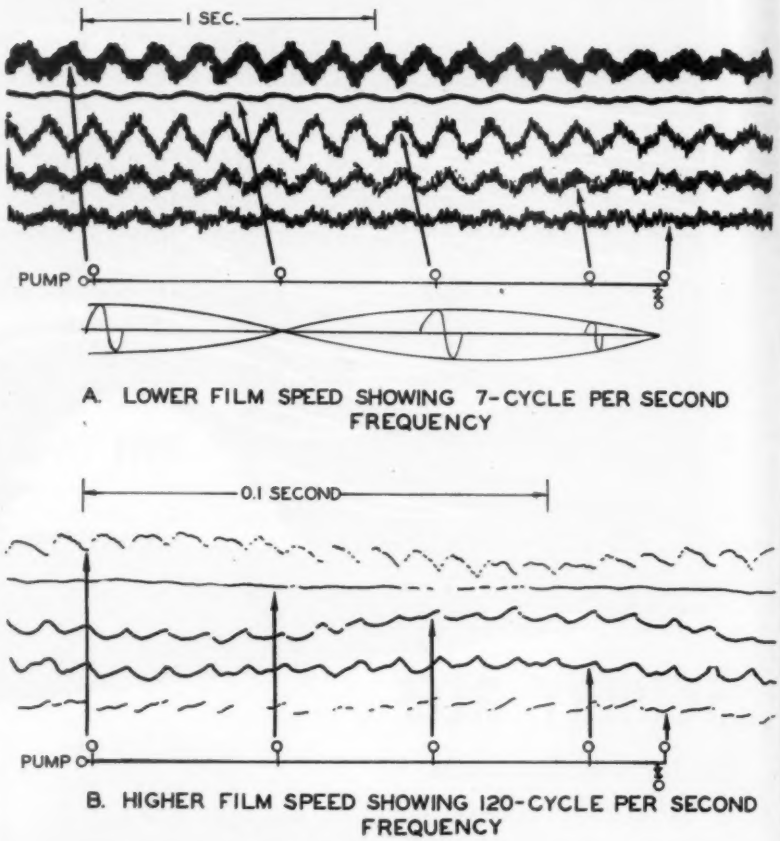
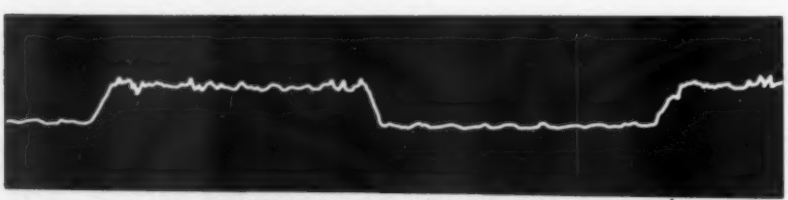

1 SEC.
PUMP
A. LOWER FILM SPEED SHOWING 7-CYCLE PER SECOND FREQUENCY
0.1 SECOND
PUMP
B. HIGHER FILM SPEED SHOWING 120-CYCLE PER SECOND FREQUENCY

Fig. 2—Comparison of recording speeds.



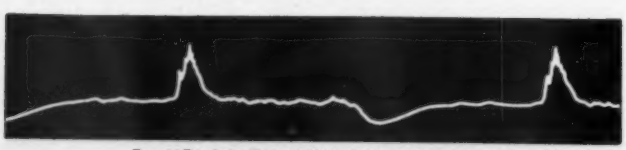


Fig. 1—Comparison of pickup response of pump cylinder pressures.

Instrumentation

Pipe-line engineers attempting to analyze transient pressures believed to be the cause of piping or pump failures are immediately aware of the shortcomings of mechanical gages. The inertia and relatively low natural frequency of the Bourdon tube and the mechanical linkage of commonly used operating gages limit their application to only a few of the problems where varying pressures are to be examined. It is for these reasons that most pipe-line surge-

pressure studies now being undertaken are using electrical instruments of some kind.

The most common type of instrumentation for measuring transient pressures usually consists of two primary units; first is the pickup or transmitter which converts a pressure change into some measurable electrical variable such as resistance, potential, or capacitance and sends out a signal as a change in potential; and secondly, the receiver which accepts the transmitted signal and produces a written record.

The pickup or pressure transducer, although partially mechanical in its use of a diaphragm or expanding tube, is designed to have a high natural frequency and minimum hysteresis and inertia. Many of the transducers now commercially available are not self-generating and therefore require an outside source of power which is changed or modulated by the transducer to provide a signal. This power supply and transducer are not often located physically at the same point; however, the two pieces of equipment may be considered electrically as making up the transmitting unit.

Since the electrical output or signal from the pickup is usually too low for direct feed into recording instrument, it is necessary that an amplifier be provided. The function of this instrument depends primarily upon requirements of recorder and can thus be considered a part of the receiver-recorder unit. The recorder receives the amplified signal from the pickup or transmitting unit and produces a trace on a chart or sensitive paper or film.

It is not probable that there is one combination of pickup and recorder suitable for all pipe-line pressure-surge problems although certain combinations do offer greater flexibility of application and range of usefulness than others.

Pressure Transducers

Pickup devices can conveniently be classified by the method in which they change or produce an electrical signal. Since most recording instruments used in the study of pressure surges are actually recording potentiometers, the signal from the transmitter unit is a voltage change. Several ways in which the transmitting unit produces this change may be tabulated as follows:

1. Strain gage and Wheatstone bridge combinations in which unbalance of the bridge produces a change in potential.

2. Condenser-type pickup instruments in which a high frequency is modulated. This requires an oscillator which may be considered a part of the electrical circuit to the transmitter.

3. Crystal-type pickup instruments which may be used to produce or change the potential of a circuit. These are self-generating.

4. Electromagnetic instruments which use a moving coil or magnet and are self-generating.

5. Electrokinetic instruments which utilize the phenomenon of the streaming potential of a liquid through a porous solid.* The device is self-generating.

In addition to the methods listed above, there are other electrical circuits upon which pressure-transducers could be based, but to the author's knowledge have not yet been utilized. One such device would use a mechanoelectronic tube, now available commercially, in which mechanical movement of the electronic tube plate produces a change in tube characteristics. Another such system would be based upon the magnetostrictive effect of certain metal alloys in strain.

Two of the most rigid requirements for a pickup device are the need for sensitivity and stability. High sensitivity may be termed the ability to produce a strong output signal with small pressure changes even at high static pressures. A pickup with good stability is one in which the transmitted signal remains constant for a unit pressure change regardless of frequency, vibration, temperature, or static pressure. Other desirable features of a pickup recommend that it be easily attached to the pipe line, is small, rugged, and requires a minimum of auxiliary equipment operating at a safe voltage.

In general, it may be stated that the transducers which are statically calibrated, i.e., strain-gage and condenser type, are not as sensitive and require more auxiliary equipment than the self-generating pickups. The self-generating devices, although high in output, are "rate of change" transmitters and may not directly indicate pressure under many conditions. However, when used in an integrating circuit, these pickups can give fairly accurate records.

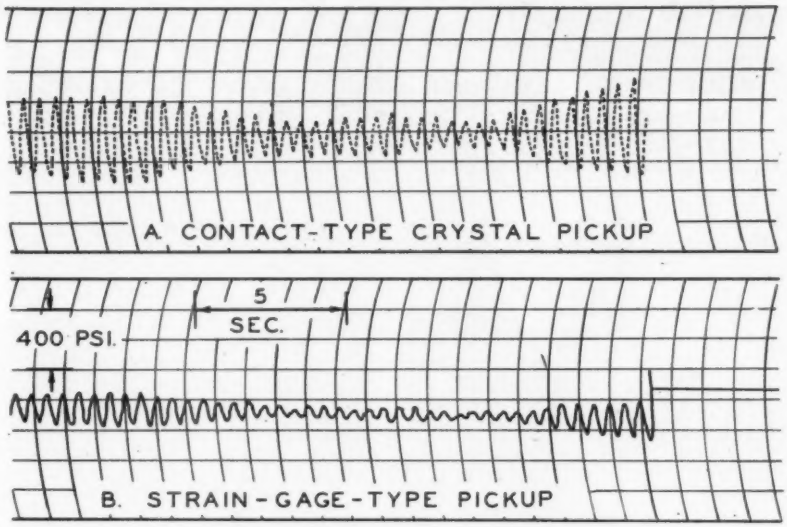


Fig. 3—Record made by direct-writing oscillograph.

In Fig. 1 is shown a comparison of the response or transmitted signal of two types of pickup devices. The upper record, 1A, shows two horizontal lines which represent the suction and discharge pressures in the cylinder of a high-speed plunger pump as indicated by a diaphragm-type strain-gage pickup. The lower record, 1B, was made by a "velocity" or rate-of-change pickup which is self-generating but which transmits a signal that is a function of the rate at which the pressure changes.

Both 1A and 1B records were made under similar test conditions on the pump cylinder and represent a total time of about 0.25 second. Since the pump-cylinder pressure has a square characteristic and maintains a constant pressure during both the suction and discharge strokes, the output of the velocity type pickup falls to zero except where the pressure is actually changing. This rate-of-change response is common to the self-generating instruments such as the crystals, electrokinetic, and electromagnetic pickups.

An apparent contradiction is shown in Fig. 2 where all five channels are connected to a velocity-type pickup which produced a satisfactory record. In this example, the electrical compensation and pressure wave character were proper for the conditions which existed.

A direct comparison of response of the strain gage and crystal pickups is shown in Fig. 3 where in 3A the pickup used was a shop-made instrument using a crystal pickup head from a record player held on the outside of the pipe wall by permanent magnets. A record from a strain-gage

*"An Electrokinetic Transducer," M. Williams, The Review of Scientific Instruments, Vol. 19, No. 10, pp. 640-646, October 1948.

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diaphragm-type pickup connected to the line at a point near the "phonograph" pickup is shown in 3B. The two records are very similar and indicate that for some pressure-surge work a tapped connection into the pipe line may not be necessary. Bonded strain gages on the pipe wall have been used in a like manner but the output signal when on standard weight pipe is very low.

Recording Instruments

To obtain data for an analysis of pressure surges, it is imperative that a written record be provided. The record should be continuous for a period long enough to permit several cycles of the surges to occur and should show the pressures at several points simultaneously. A beat frequency of rather slow repetition is often present between two or more reciprocating pumps and is sometimes audible as a building up and dying down of noise in station piping. Continuous records of several minutes' duration are also required in the study of long-line pressure surges.

The amplifier-recorder instruments are usually similar to those used in geophysics or in dynamic stress analysis work and include:

1. Direct-writing galvanometers of the type using a moving coil motor and light-weight inking pen.
2. String galvanometers which use a mirror and light source to produce a trace on sensitive paper or film.
3. Cathode-ray oscillographs which provide a photographic record of the cathode-ray tube face.

The most desirable recorders will have suitable direct-current response as well as good fidelity at the high frequencies. Several channels are usually required and it is an advantage to have available a timing signal showing directly on the record.

The direct-writing galvanometer conveniently provides an inked record immediately available. The recording string galvanometer and cathode-ray oscillograph trace on sensitive paper or film which must be processed. The latter method of producing a record is common practice in geophysics work and the instruments are not as limited in frequency response as is the direct-writing instrument.

In selecting a recording receiver, careful consideration should be given to frequency response, imput requirements, power supply, and the type of record desired. Other items, such as chart or film speed, timing signal, and calibration devices are usually determined by the particular application. The ability of a receiver to record other types of mechanical movement such as valve position, pump rotation, and vibration is very useful or sometimes essential.

In Fig. 3 is shown a record taken by a direct-inking, two-pen oscillograph which writes on a paper strip chart having printed cross-section lines. This type of recorder is avail-

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able in multiple channels and chart speeds but, as mentioned before, is limited in its frequency response by the inertia of the moving parts.

A typical film record is reproduced in Fig. 2 showing the appearance of similar pressure surges recorded at two different film speeds. The upper record, 2A, represents a total time of about 2.5 seconds, while the lower record, 2B, was taken in less than 0.2 second. The graphic representation of the surge conditions shown in 2A indicate that a standing wave existed at the time of test and also illustrates the value of multiple-channel recording.

A six-channel amplifier-recorder unit built for Humble Pipe Line Co. has individual, direct-coupled package-type amplifiers and 2-in. cathode-ray tubes are provided for each channel. The cathode-ray tubes face the recording camera which is mounted on the front of the instrument and are arranged in two vertical banks of three each. The camera uses standard 35-mm. film and has a single selector for nine film speeds varying from ½ to 14 in. per second. A timing-signal neon light, tuning-fork controlled, is used to make a small spot on the edge of the film record and may be set at any of several frequencies up to 100 per second.

Two 6-volt storage batteries provide sufficient power for 1 day's normal operation of the instrument. The power supply unit (not shown) and amplifier-recorder can be easily transported in the back seat of a passenger car and, since the unit is battery operated, is entirely portable. Simultaneous calibration of the six receiving channels is easily performed within the instrument by application of a known voltage to the input of each amplifier. A linear sweep circuit built into the recorder permits visual observation of the trace on the cathode-tube face.

General Data

The term "high frequency" is a relative index often used by engineers to denote a quickly recurring phenomenon associated with mechanical vibration or wave motion of many sorts. Another interpretation of the term may refer only to a single pulse or pressure change in which a steep fronted or square wave is considered to have very high-frequency components. This latter meaning of the term comes from the theory which permits resolution of any wave shape into sinusoidal components. It is, therefore, apparent that a square wave would necessarily be resolved into many high-frequency sine waves for good conformation of the two. This fact alone thus places a high-frequency requirement on pressure-surge instruments which are expected to transmit and record faithfully the unusual wave shapes found in station piping and reciprocating pump problems.

In general, the instrument requirements for the study of long-line surges are similar to those for station-piping problems; however, frequency response may not be as critical but synchronizing of records from widely spaced tests is more difficult. Radio or land communication lines might reasonably be used as has been done on previous tests.

The emphasis which should be placed on each of the individual instrument requirements mentioned above would naturally be governed by the problems to be studied. Humble Pipe Line Co. is now using pressure-surge instruments which are satisfactory for most problems encountered in pump-station piping. Two types of pickup devices are used interchangeably with one recording unit. For some problems, a diaphragm strain gage and battery supplied Wheatstone bridge make up the transmitting unit but, where frequency analyses are to be studied, the electrokinetic pickup is used. The two pieces of equipment although each is limited in use, do provide the data ordinarily required for determining the magnitude and frequency of pressure changes in pump-station piping.

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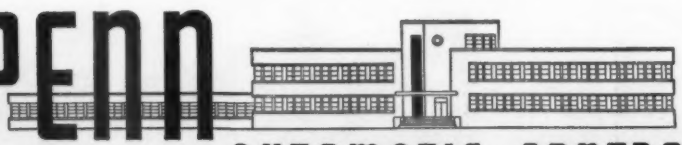

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

Laboratory Crude-Oil Evaluation

What is the least amount of testing that must be done in conducting a true-boiling-point crude-oil analysis? What must we get from the laboratory in order to properly size up a crude oil?—S. O. D.

Every authority has his own opinion of the least amount of laboratory work that must be done in order critically to evaluate a crude oil. However, here is an outline of a greatly abbreviated, yet complete analysis:

1. Crude-oil tests:
(a) A.P.I. gravity.
(b) B.s. and w.
(c) Pour point.
(d) Sulfur percentage.
(e) Salt content.
(f) Viscosity at 100° F.
(g) Viscosity at 210° F. or Viscosity at 130° F.

2. True-boiling-point distillation up to an atmospheric boiling point of 880° F. with a charge of at least 3,000 ml.

3. Fraction examination:
(a) A.P.I. gravity on all fractions.
(b) Viscosity at 100° F. of each fraction above 600° F.
(c) Viscosity at 210° F. of each fraction above 725° F.
(d) Aniline point of fractions nearest 300, 400, 500, and 600° F.
(e) Smoke point of fraction nearest 450° F.
(f) Sulfur content of fractions nearest 300, 400, etc., through 800° F.
(g) Carbon residue of true-boiling-point bottoms.

4. Fraction blends:
(a) Residue blends—at least four ranging from gasoline on to the final residue of the T.B.P. distillation.
A.P.I. gravity.
Viscosity at 210° F.
(b) Full diesel fuel—400°-700° F.
A.P.I. gravity.
A.S.T.M. distillation.
Pour point.
(c) Heavy diesel fuel—450°-650° F.
A.P.I. gravity.
Pour point.
(d) Lube product—750°-880° F.
A.P.I. gravity.
Pour point.

5. Gasolines. — A semifractionating batch distillation of enough crude oil to produce 3 gal. of gasoline.
(a) Aviation blend—300 T.B.P. cut.
A.P.I. gravity.
A.S.T.M. distillation.
Octane number—M.M.—clear.
Octane number—3 cc. TEL.
(b) Motor blend—400 T.B.P. cut.
Same tests as 5(a).

This abbreviated analysis along with computed constants such as characterization factor, diesel index, viscosity index, etc., will permit judgment regarding the following products:

Gasoline—Octane number, lead response, and sulfur.
Jet fuel—Aniline point and sulfur.
Kerosine—Smoke point and sulfur.
Diesel fuel—Diesel index, sulfur, and pour point.
Lube oils—Viscosity and pour point.
Solvents—Aniline point and sulfur.
Residues—Gravity and viscosity.
Asphalt—Amount (from carbon residue).

It does not give complete information but many of the other tests conducted on product blends, such as flash point, vapor pressure, copper number, neutralization number, etc., are really unnecessary in an evaluation type of analysis.

More could be desired with respect to the evaluation of asphalts. However, if such an evaluation is needed, it is necessary to flash vaporize the crude oil to remove light ends, flash vaporize the topped crude oil to produce a residue of 60 or lower penetration, distill the heart cut in a vacuum Hempel-type distillation to the very highest temperatures, and then make blends of the hard asphalt with lube fractions to cover the penetration range of 60-180. If such a complicated procedure is followed, then lubricating-oil products should also be prepared.

Heating Coils for Oil Storage Tanks

On pages 507 and 519 of the Third Edition of Petroleum Refinery Engineering, you mention the heating of tanks but not the amount of heat or surface required to supply hot fuel oil. Can you indicate how this situation is handled? R. P. S.

If the question is properly understood, it means that there is no reason to keep the entire fuel tank hot—that only the fuel oil currently being used needs to be heated. If this is the proper interpretation of the question, the answer is that enough heat must be supplied to raise the temperature of the current (or maximum) demand of fuel oil from the tank temperature to the desired fuel-oil temperature, plus, of course, the heat losses from the walls of the somewhat cool tank.

If the coil is simply inserted in the tank, the entire tank becomes hot, and once the tank temperature is attained only enough heat need be supplied to supply the heat losses. Note, however, that this is a maximum heat requirement because not only must **all** the oil be heated but in addition the heat losses must be supplied until the tank is empty.

If the coil is inserted at or around the outlet, i.e., a suction oil heater of the U-bend type is employed, then the entire tank need not be maintained at the full fuel-oil temperature. Such installations are quite common and they are obviously useful in large tanks where the heat losses would be excessive.

As one illustration, consider a 1,000-bbl. tank being maintained at 150° F., when the weather temperature is 50° F. It is filled each fifth day during a 12-hour heating time using exhaust steam. According to Fig. 203 of the Third Edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York, 1949) which applies to the very heaviest semisolid oils, the amount of heating surface required and the steam consumption if the tank is maintained at 150° F., is about as follows:

Heating surface, 1,400 sq. ft.

Average steam consumption, 790 lb. per hour.

If the rate of heating is 120 hours rather than 12 hours, the surface required is only about 250 sq. ft.

However, if a suction heater is employed, only the fuel output needs to be heated (as a minimum) and the steam consumed is only:

$$200 \times \frac{42}{24} \times 8.33\,(150 - 50)\,0.42 \times \frac{1}{970}$$

$$= 126 \text{ lb. per hour}$$

and the surface required is only about 100 sq. ft. Of course, some heat will be lost to the oil surrounding the suction heater, or in other words, the tank will generally be warmer than 50° F., but just how much this will amount to can only be estimated.

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Gravity Drainage and Capillarity

IN previous discussions of gravity drainage it has been implied that the oil level in a reservoir will fall under gravity control much as it would in a tank. Actually, this is not so because capillary forces will not permit a sharp level of demarcation to exist between fluids in a reservoir. These capillary forces are the main control in evaluating gravity drainage rates and mechanism. The first capillary-pressure curves reported in the petroleum literature were actually gravity-drainage curves obtained in a sand column filled with water.[1]

If one were to drain oil from the base of a reservoir and stop the flow at some arbitrary point to permit the fluids to come to equilibrium, the distribution of oil and gas would be as demanded by the capillary-pressure curve. The distribution of oil saturation might look something like that shown in Fig. 1, for example. Now, if the reservoir were drained again after this equilibrium had been established and were again shut in, the relative distribution of oil and gas would again be as demanded by the capillary pressure curve at a new level, perhaps that shown by the dotted line in Fig. 1.

If the drainage were carried on slowly enough the distribution would never depart from the equilibrium position shown. The gravity-drainage oil level would be that of the transition zone. The maximum rate of withdawal for a true and complete gravity segregation would, therefore, be that which could not be exceeded without destroying the equilibrium position of the drainage capillary-pressure curve.

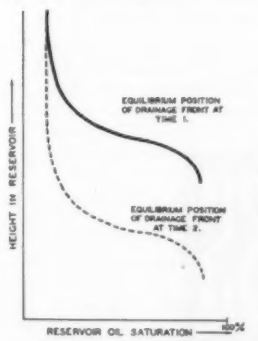
The drainage can be carried on in excess of the rate to give stable equilibrium. In this case the drainage front would be destroyed. This result can be reasoned from two standpoints. Inasmuch as the oil saturation is highest at the lower part of the drainage curve in Fig. 1, the relative permeability to oil will be the highest. The flow of oil at this point can therefore be the greatest and the oil saturation can change more rapidly than it can at higher points in the reservoir. Also, as a matter of experience, it is known that a considerably longer time is required when running a capillary-pressure curve to attain equilibrium at low liquid saturations than at high liquid saturations. These thoughts would lead to the expectation of an elongated drainage front when the equilibrium drainage rate was exceeded.

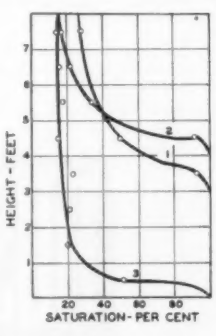
Huntington et al.,[2] show some of these principles in experiments performed on draining a small column. Fig. 2, which is their Fig. 6, shows the redistribution of saturations after drainage had been stopped. The distribution reverts to the capillary curve.

Fig. 3, which is their Fig. 3 also, shows the elongation of the drainage front at high rates. At the start of this experiment the saturation was 100 per cent all through the column. In the first 35 minutes, 8.2 per cent of the oil drained from the column to give the distribution marked (1). Between Curves (1) and (2) the rate of drainage was 8.2 per cent in 61 minutes. Thus, the reduced rate of drainage permitted the saturation distribution of the draining fluid to flatten out. Had this column been sufficiently long that the withdrawal rate could be kept constant, the curves at successive times would not have flattened out as shown.

In effect, therefore, it should be possible to evaluate the rate not to be exceeded for a complete drainage without gas bypassing. This rate and the distribution of saturations during drainage would be governed by the capillary properties of the reservoir rock and its contained fluids. With a uniform pore distribution the level of drainage would be quite flat. With a very irregular pore distribution the level of drainage might be quite elongated. Low permeabilities would tend to reduce the rates at which effective drainage could occur although it is obvious that reduced rates are the only prerequisite to draining a low-permeability rock.

These observations show that there is more to efficient gravity control than to shut in high-structure wells and withdraw from low wells. Although this may ultimately produce as much oil by drainage, too fast a withdrawal can dissipate gas energy, further reducing the rate of drainage than can be attained.


EQUILIBRIUM POSITION OF DRAINAGE FRONT AT TIME 1.
EQUILIBRIUM POSITION OF DRAINAGE FRONT AT TIME 2.
HEIGHT IN RESERVOIR
RESERVOIR OIL SATURATION



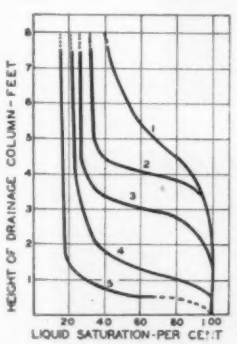


Fig. 1—(Left) Movement of equilibrium drainage level downdip. Fig. 2—(Center) See A.I.M.E. Trans. 1942-43 reprint, page 350. Reference 2. Curve 1 = Saturation distribution at 3½ hours of drainage; Curve 2 = Saturation distribution after shutting off drainage; Curve 3 = Static capillary pressure curve. Fig. 3—(Right) See A.I.M.E. Trans. 1942-43 reprint, page 347, Reference 2.

References

1. Leverett, Capillary Behavior in Porous Solids. A.I.M.E. Trans. 1941, Vol. 142.

2. Stahl, Martin, and Huntington, Gravity Drainage of Liquids From Unconsolidated Wilcox Sand. A.I.M.E. Trans. 1943, Vol. 151.

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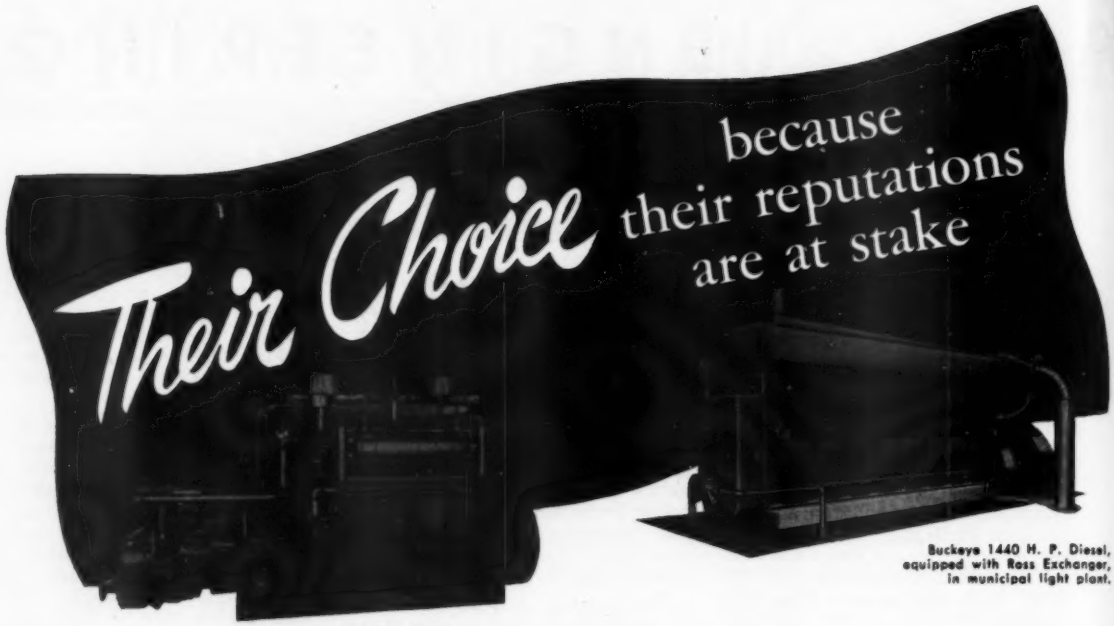

Buckeye 1440 H. P. Diesel, equipped with Ross Exchanger, in municipal light plant.

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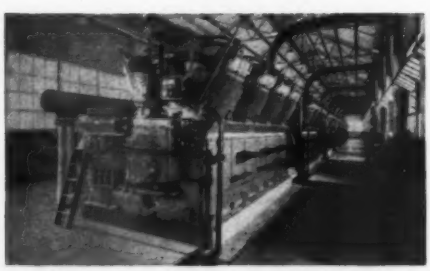
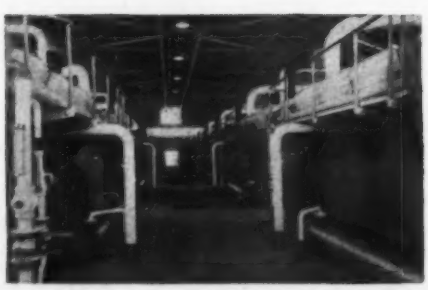


Nine Cooper-Bessemer gas compressors, equipped with Ross lube oil coolers, serving natural gas pipe line.



One of 14 Ingersoll-Rand 1000 H. P. gas compressors, equipped with Ross lube oil coolers, serving natural gas pipe line.

★ **Design Data** . . . and complete details on Ross cost-saving standardization: **BULLETIN 1.1K1**, all copper and copper alloy, fixed tube sheet Type BCF; **BULLETIN 1.7K1**, all stainless steel, fixed tube sheet Type SSCF; **BULLETIN 2.1K1**, cast iron or steel shell, removable bundle Type CP; **BULLETIN 2.2K1**, all copper and copper alloy, removable bundle Type BCP.

Write on Company letterhead to Ross Heater & Mfg. Co., Inc., Division of American Radiator and Standard Sanitary Corp., 1417 West Ave., Buffalo 13, N. Y. In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

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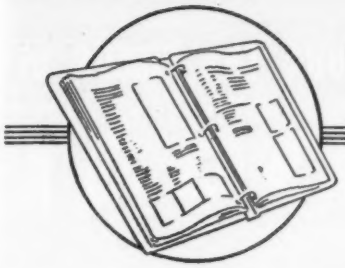

THE REFINER'S notebook

Instrument Air System

IN describing the operation of a controller using air as the actuating medium (Refiner's Notebook, June 22, 1950, page 331) it was noted that the basic action consisted of an air jet issuing from a nozzle and moving a flapper or baffle. Nozzle diameters may run from about 0.02 to 0.04 in. Another small opening in the controller mechanism is the restriction, in the form of capillary tube or orifice, placed in the controller air supply line. This restriction may have a diameter which is one-half or one-third the nozzle diameter. Additional small openings are found in the air-relay or pilot valve. Existence of such small openings or restrictions in the pneumatic controller emphasizes the need for a supply of air that is always clean and dry. In the design of the instrument air system particular attention is therefore paid to elimination of solid particles, of water, and drops of oil that may be carried over into the instrument air supply line.

Basic requirements.—(1) The instrument air system must be designed for reliability in production of air. To prevent air failure a standby compressor with automatic cut-in is provided. Use of the general yard or utility air system is usually unsatisfactory since instrument air must be supplied at constant pressure. (2) Proper sizing is important. The instrument air system must be sized for normal use, with additional capacity provided for blowdown and possible future expansion. (3) The air supplied to the instruments must be clean at all times. Solid particles, dust, scale, and oil must be eliminated to prevent plugging of nozzles and pilot valves. If the general utility air system is used to supply air to instruments there is the possibility of contamination through tie-in with caustic, ammonia, or acid systems in the refinery. An actual case where this happened with caustic carried into the controller is cited by Ludi.[2] (4) Since the air after being compressed with resulting rise in dew point will ultimately be cooled back to the original temperature it had before compression, water may settle out at various points including the air supply piping and instruments. This may lead to corrosion of the piping and formation of rust particles. There is also possibility of water freezing in lines and thus cutting off the instrument air. For these reasons relatively dry air must be provided.

Sizing the Air System

In determining compressor capacity a tabulation must be made of the number of pilot or relay valves involved in the plant control system as well as the number of remote transmission controllers, valve positioners, and temperature controllers.

Pilot valves.—As noted in the earlier installment referred to above, the amount of air issuing from the nozzle in a controller is regulated by means of the pilot or relay valve. The pilot valve acts to amplify air pressure and volume so that rapid response in the bellows action is obtained. Pilot valves may be balanced or nonbalanced, with the former further divisible into bleed or nonbleed types and the latter consisting of either a three-way valve or a valve with a fixed restriction. A balanced pilot valve is one in which the inlet and exhaust seats are covered at the same time at steady (equilibrium) output pressure. Provided with a small continuous bleed from the output pressure port to the atmosphere, the balanced valve will have a small air consumption compared to a nonbalanced pilot. The nonbalanced valve with a fixed restriction may have this restriction in either the supply port (fixed supply and variable exhaust) or may have a fixed exhaust and variable supply.

Average air consumption of three-way (nonbalanced) relay valves will generally be higher than for a balanced valve with bleed. However, the air consumption of the balanced pilots will vary with changes in output pressure to the control valve. Therefore, to obtain an accurate figure on air consumption of balanced pilots study of process behavior may be necessary. A process with constantly changing control point obviously will require more air with this type of pilot than one which requires fairly steady output pressure to the diaphragm head of the control valve. For a given control system air consumption of pilots may be estimated by obtaining a record of total instrument air flow and dividing by the number of pilots in the system.

In sizing the air system, 0.5 standard cubic feet per minute may be allowed per pilot, using the consumption of nonbalanced valves as a basis. This is doubled for each remote transmitter-receiver in the system and for each valve positioner. It may also be desirable to use a figure of 1.0 standard cubic feet per minute for temperature controllers. Balanced pilots with bleed will consume between 0.3-0.5 standard cubic feet per minute. Some consideration may be given to the condition of the control valve. Additional safety factor is allowed for blowing down of lines, for change in efficiency of compressor and for future addition of more instruments, as well as leakage in the air system.

Pressure. — Most control instruments operate at 17-22 psi. and are provided with automatic or manual control for air pressure. Allowing for pressure drop through the reducing valve just before the instrument and further drop through lines and auxiliary equipment in the air system, the supply header for the instrument air should operate at 30-35 psig. with compressor discharge at 40-45 psig.

References

1. Eckman, D. P., Principles of Industrial Process Control, Wiley and Sons, New York, p. 215.
2. Ludi, W. C., Petroleum Refiner, October 1946, p. 94.
3. Mason-Neilan Regulator Co., Technical data bulletin.

No. 41 in current series. The Refiner's Notebook has been published continuously since 1944.

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TRADE LITERATURE

1 MODERN OIL-FIELD OPERATION is a presentation of automatic controls applied to electric motor pumping with central power station, centrally controlled individual pumping engines, and pipe-line and storage-tank pumping. *Synchro-Start Products.*

2 PRESSURE GAGES FOR EVERY PURPOSE. a 76-page, illustrated catalog lists and describes a complete line of indicating and recording pressure gages and accessories. All engineering data are included for each model. *Sydney Smith & Sons, Ltd.*

3 CUT YOUR CONTRIBUTION. Use of Scotch brand electrical tape No. 22 to protect pipe lines against corrosion by water, salt water, acids, alkalies, and soils is described in a new four-page multicolor brochure. Possible savings of approximately 50 per cent over other methods are cited in the brochure. *Minnesota Mining & Manufacturing Co.*

4 THE CORRECT WIRE ROPE FOR YOUR EQUIPMENT. All sizes and construction classifications are combined in one large table. This bulletin contains information on how to order wire rope, and explains and describes wire-rope constructions. *Macwhyte Co.*

5 BULLETIN MS-20-B describes 2 by 4-ft. and 3 by 4-ft. dual and single-unit mud screens, used mainly for shallow and medium-drilling operations; and the 4½ by 5-ft. heavy-duty mud screen for deep-drilling operations. *Overstrom & Sons.*

6 DI-TERT-BUTYL-PARA-CRESOL. This 13-page bulletin gives technical and commercial information concerning DBPC, brief descriptions of current uses and chemical reactions, and a bibliography of scientific references. DBPC is a crystalline, trialkylated phenol which is insoluble in water and aqueous alkali of any strength. Being a hindered phenol, it undergoes few of the reactions typical of unhindered phenols. *Chemical Division of Koppers Co., Inc.*

7 LAYNE SHORT COUPLED SERVICE PUMPS contains cut-away drawings of pump bowls and discharge column. Sixteen sketches show the Layne vertical turbine pump applied to river and relift service, boosting, recirculation, cooling tower, drainage, gas and oil pumping, and fire pumps. *Layne & Bowler, Inc.*

8 DRICOOLER BULLETIN DC-50. Three new DriCooler models that have been added to a line of dry cooling equipment are described. Dimensions and weights on the new models, as well as rating tables for cooling water, are given. *Marley Co., Inc.*

9 HIGH-PRESSURE PUMPS. New data sheet 64-B describes the recently designed Aldrich 5-in. stroke multiplex direct-flow pumps. This 6-page bulletin covers design advantages, construction, specifications, and drive requirements. Also included are: a pump selection chart, dimen-

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sion drawings, plunger, pressure, and capacity data on both the 5 and 7 plunger units. *Aldrich Pump Co.*

10 A COMPREHENSIVE pH ELECTRODE CATALOG. The complete line of pH electrodes and assemblies for both industrial and laboratory applications is presented in a new, 28-page catalog. This publication is designed to help present users of pH equipment in ordering replacement parts and to guide new or prospective users in selecting the proper electrodes to solve their pH problems. *Leeds & Northrup Co.*

11 EFFICIENT HANDLING OF PETROLEUM PRODUCTS. This booklet describes not only some 10 regular services provided to the petroleum world by the Saybolt organization, but tells how Saybolt men help in the solution of out-of-the-ordinary problems that arise to perplex oil men. *E. W. Saybolt & Co.*

12 CORROSIONPROOF CEMENTS. This bulletin describes Atlas' complete line of resin, sulfur, silicate, and asphaltic cements. Information on each cement is compiled in handy chart form which is helpful in the selection of the correct cement for a specific application. *Atlas Mineral Products Co.*

13 STOODY HARD-FACING ALLOYS is a handy, pocket-size booklet covering general uses, composition, properties, sizes, styles, coverage per pound, and accepted applications of hard-facing alloys. It lists the correct selection for hundreds of pieces of wearing equipment. *Stoody Co.*

14 ALUMINUM STANDARD WAREHOUSE ITEMS is a 36-page compilation of data sheets listing specifications on sheet and plate, wire, rod, and bar, structural shapes, extruded shapes, tubing and pipe, pipe fittings, handrail fittings, screw machine products, rivets, castings, and specialties. *Metal Goods Corp.*

15 BETTER-BUILT FIRE EXTINGUISHERS, a 6-page, two-color brochure illustrates hand-portable and wheel-portable extinguishers and accessories for vaporizing liquid, soda acid, foam, clear water, and carbon dioxide charges. *Buffalo Fire Appliance Corp.*

16 OGDEN AUTOMATIC PUMP for use under atmospheric, pressure, or vacuum conditions for water, oils, or process liquors, is described and illustrated in pamphlet 118. Capacity range is from 40 to 1,200 g.p.m. *Spirax Manufacturing Co., Ltd.*

17 SUCKER RODS. Sucker rods for every field condition are described and illustrated in color in a new 16-page bulletin No. 368. The bulletin covers three grades of sucker rods, each recommended for certain load and corrosive conditions. It also includes specifications for hollow sucker-rod couplings, pony rods, polished rods, and pull rods. *National Supply Co.*

18 PUMP VALVE INSTALLATIONS IN LARGE PUMPING STATIONS is an account of many actual installations in water-pumping applications with especial emphasis on savings to operator. *Birch Manufacturing Co.*

19 NEO-DRY CONCRETE SEALER is a data sheet on a rubber base, fast-drying, easy-to-apply sealer for concrete floors. The material is highly resistant to abrasion, water, oil, grease, alkali, acids, and soap. *Multi-Clean Products, Inc.*

20 METEX MIST ELIMINATORS is an illustrated eight-page folder discussing a modern way of coalescing and removing liquids entrained in the vapor in vacuum stills, scrubbing towers, knock-out drums, evaporators, and similar equipment. *Metal Textile Corp.*

21 HAYNES ALLOYS HARD-FACING MANUAL. Among the subjects covered in this 40-page booklet are: Which Metal Can Be Hard-Faced; How to Select the Right Rod; Which Welding Process to Use; How to Make the Deposit; and Properties of Haynes Hard-Facing Alloys. *Haynes Stellite Division, Union Carbide & Chemical Corp.*

22 CLASS 2000 PRESSURE BLOWERS. In addition to many photographic illustrations, this book presents performance charts, and detailed engineering drawings of 16 and 24-ft pressure blowers. *Moore Co.*

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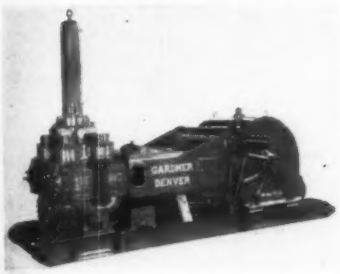
IT'S NEW CHECK IT

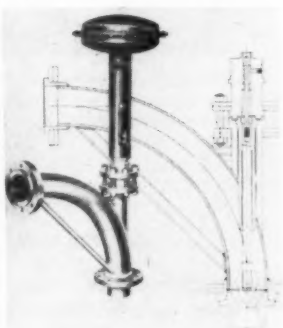
by Dan B. Miller

23 NEW 650-HP. SLUSH PUMP, engineered especially for deep-hole drilling, is a 7½ by 18 duplex power pump rated at 650 hp. The GXR has a one-piece, dustproof main frame cast of special Gar-Durloy alloy. The eccentric power end construction results in low bearing pressures, while double helical-drive gears relieve main and jackshaft roller bearings of all thrust loads. The one-piece connecting rods eliminate bolts. Liquid cylinders are freely interchangeable between right and left-hand positions, and are fitted with screwed-type valve pot covers which reduce valve-inspection time. Pistons and rods can be changed without opening the power end. The power end is fully protected against drilling mud, and is pressure lubricated with filtered oil. *Gardner-Denver Co.*



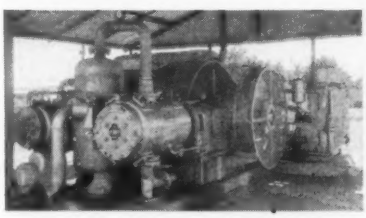
IT'S NEW CHECK IT

24 LONG-SWEEP ANGLE VALVES. The 7,000S series Flo-Tested long-sweep angle valve is designed primarily to produce minimum turbulence in the flow through the valve and for use on slurry service where the solids in suspension tend to plug the conventional-type control valve. The plug guide is extremely long to assure ample guiding of the valve plug even where it is operating very close to the seat. Valve plugs are of the high-lift type, normal lift being one-half the nominal valve size. Seat is actually designed as a section of a venturi throat. This also assures minimum turbulence in the seat section. The venturi seat is built as one piece and is the retained type. Conventional seats are threaded and screwed into the valve body. Long-sweep angle valves can be provided in any size from 2 to 6 in. Bodies can be supplied of carbon steel, type 304, 309, 316, and 347 stainless steel as standard. *Hammel-Dahl Co.*



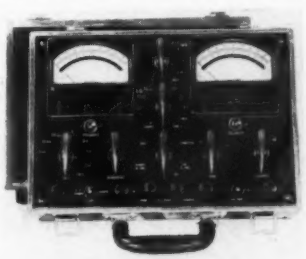
IT'S NEW CHECK IT

25 KNIGHT GAS BOOSTER UNIT, consisting of Gardner-Denver compressors and suitable power units, is available in sizes from 5 to 300 compression horsepower. These skid-mounted units are designed for either outside or inside installation. Although they are portable and can be quickly installed, they have the capacity and performance of a permanent installation. They are easy to disconnect and move and are compactly built to road limits. Automatic safety features make safe, continuous operation possible without constant supervision. Replacement parts are readily available. *Knight Manufacturing & Supply Co.*



IT'S NEW CHECK IT

26 MULTI-COMBINATION METER for electrolysis, corrosion, and cathodic-protection testing, is small, compact, and low-priced. It has a low range of 2 mv. and special mirror scales 3.9-in. long. Accuracy is to 1 per cent. Practically all measurements encountered in electrolysis and corrosion investigations and cathodic-protection testing in field and laboratory can be made. By use of a circuit selector switch, the two high-sensitivity d.c.



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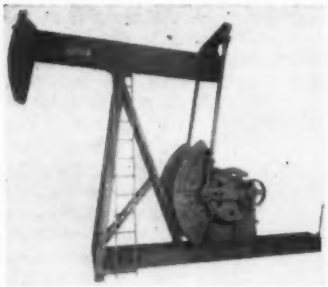
instruments can be connected into a variety of measuring circuits for measurement of potentials, current, resistance, and soil resistivity. Internal batteries with switch and coarse and fine controls can be used to supply and control current for test purposes. Voltmeters, or voltmeter and ammeter can be used separately or simultaneously. Polarity reversing switches are provided for both current and potential measurements. *M. C. Miller.*

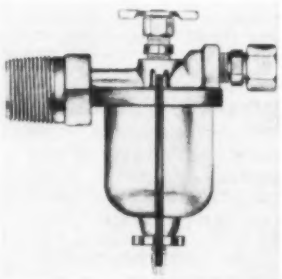
IT'S NEW CHECK IT

27 NEW F-16-DA114 PUMPING UNIT. This unit has a polished-rod load capacity of 15,900 lb. and a peak torque capacity of 114,000 in.-lb. It features the Ideco wheel-type counterbalance crank, a rigid four-legged samson post, a new sturdy, welded subbase under the reducer, and clamp-type pitman connections. The speed reducer is fitted with herringbone gears and all shafts are carried on roller bearings. To assure a continuous supply of clean lubricant it is fitted with a magnetic-type oil sump and labyrinth seals on all shaft extensions. *International Derrick & Equipment Co.*



IT'S NEW CHECK IT

28 SETTE is a new filter for oil-burning equipment which eliminates the necessity of periodic cleaning of the burner. The filter attaches directly to the drum or tank where it traps and retains all dirt, scale, and other fuel-oil impurities, which normally gum up and eventually clog the burner. The filter itself is very easily installed and quickly emptied and cleaned. *Marquart Manufacturing Co.*

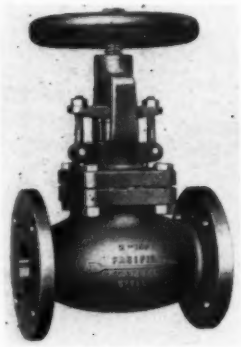


IT'S NEW CHECK IT

29 TUNGSTEN-CARBIDE BALLS. For accurate size control of internal diameters and low production costs, the use of tungsten-carbide balls is recommended. Extreme hardness, high surface finish, and compressive strength of tungsten carbide balls result in excellent surface finish and good size control and size uniformity of the finished part. Ball burnishing permits inexpensive, automatic production layouts, employing dial or hopper feeds for the parts and a recirculating setup for the tungsten-carbide balls. Even for large-volume production, replacement costs for carbide balls are negligible because of their long tool life. Tungsten-carbide balls can be furnished in sizes from 1/32 to 3-in. diameter, with size tolerances of of plus/minus .000025 in., sphericity tolerances of .000010 in., and surface finishes of 1 microinch. *Industrial Tectonics, Inc.*

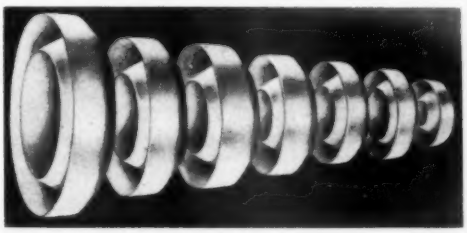
IT'S NEW CHECK IT

30 CORROSION-RESISTANT VALVES. These valves have wide usage in refineries, chemical plants, and other industries where handling corrosive fluids, atmospheric corrosion, or metal contamination is a problem. Valves can be supplied from stocks on hand cast of Pacific's 316 Alloy (Type 316 stainless steel) or Pacific's Alloy 20. The new line of stainless steel valves includes: 150 lb., O. S. & Y., bolted bonnet gate valves in sizes ½ to 8-in.; 150-lb., swing check valve with bolted bonnet in sizes ½ to 6-in.; 150-lb., inside screw gate valve with screwed-in bonnet in sizes ½ to 2-in.; 150-lb., O. S. & Y., globe valve with bolted bonnet in sizes ½ to 6-in.; 300-lb., O. S. & Y., globe valve with bolted bonnet in sizes ½ to 1½-in.; and 600-lb., O. S. & Y., gate valve with bolted bonnet in sizes ½ to 2-in. *Pacific Valves, Inc.*



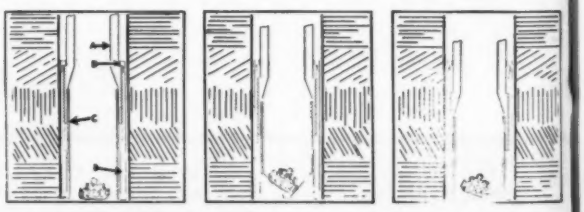
IT'S NEW CHECK IT

31 CHEMLON V-RINGS molded from pure Teflon are frictionless, cause no wear on hydraulic valves, and last many times longer than conventional packing. Chemically inert, and not affected by corrosive solutions, they stand temperatures up to 450° F. Even at varying operating pressures, tough, resilient chemlon V-rings insure a perfect, permanent seal with just finger-tip pressure on the gland. Chemlon V-Rings are supplied in numerous standard sizes from stock, and in special sizes. *Crane Packing Co.*



IT'S NEW CHECK IT

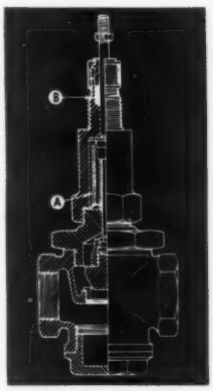
32 MECHANICAL JUNK BASKET. Outstanding features include complete job on bottom in less than 5 minutes, greater ease of operation, and much larger junk capacity. It readily picks up and brings out of the hole anything that can enter the finger-type catcher. It has the largest junk capacity for any given hole size, and is very simple in construction, consisting of only four



parts: body, outside sleeve, finger-type catcher, and lock ring. The finger-type catcher threads into the i.d. of the body (A) and fits loosely in the outside sleeve (B), so that the teeth of both are perfectly aligned as the unit is run into the well. The lock ring (D) eliminates any possibility of the pieces unscrewing in the hole, yet allows them to turn freely. *McCullough Tool Co.*

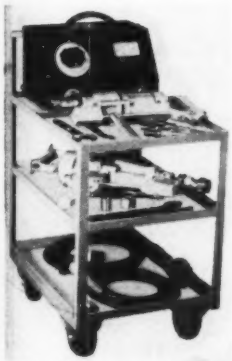
IT'S NEW CHECK IT

33 METAFLOW, a new air-operated control valve for regulating flow of steam, water, oil, or gases, is diaphragm operated for pressure differentials below 75 psi. Sizes range from ½ through 2 in. Housing is high-strength aluminum alloy. A hydraulically formed long-lift brass bellows provides smooth and powerful stroke. Packless valve prevents leakage of inflammable or harmful liquids or gases and provides vacuum protection. It is equipped with a brass adjusting screw with rust-proofed steel spring having 15-lb. adjustment range to give proper sequence operation. Polished stainless-steel stem in preformed lubricated metallic packing insures long life and low hysteresis. *Powers Regulator Co.*



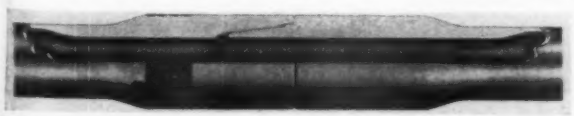
IT'S NEW CHECK IT

34 TUBE EXPANSION CONTROL is now available as a compact, mobile unit. The complete unit consists of a welded steel frame truck on which the control system, extra motors, expanders, mandrels, cables, and accessory tools are placed on shelves where they are easily accessible. Four different electric motors that furnish the range of power needed for every industrial tube rolling need are available for use with the control. Tube Rolling Control is designed to produce accurate, uniform results when rolling heat exchanger and condenser tubes. The control automatically stops expansion when the tube is properly rolled. Uniform results are obtained as the control is precalibrated and may be set for the tube size and tube sheet thickness being worked. *Airetool Manufacturing Co.*

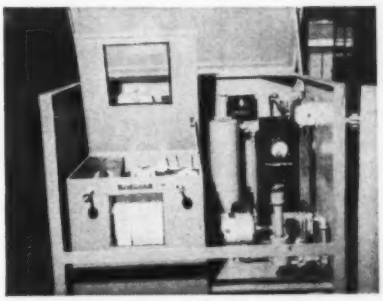


IT'S NEW CHECK IT

35 FLASH-WELDED TOOL JOINTS. This tool joint is now available for all popular sizes of A.P.I. drill pipe; with or without hard metal bands; and in a choice of 18° or square shoulder design. The firm has installed the most modern of flash-weld electrical machinery, along with the latest testing equipment, to insure the high quality in its flash-welded tool joints. *American Iron & Machine Works Co.*

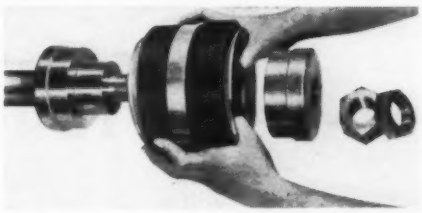


36 FORMATION LOGGER embodies the principles of two old, well-proven instruments: the Drilling Rate Recorder and the Formation Gas Detector. This unit permits the drilling operator or geologist to obtain a constant recording of the rate-of-bit-penetration, thus identifying drilling breaks. The Gas Detector records the presence or absence of hydrocarbons in these formations. The instrument may also be used as a warning device in detecting the existence of dangerous gas-cut mud. *Petroleum Instrument Co.*



IT'S NEW CHECK IT

37 NEW TYPE HD SLUSH-PUMP PISTON permits the changing or original installation of rubbers without having to go through the process of disassembly. As shown in the accompanying illustration, all that is required is to remove the piston-rod nut and a follower, and end plates, center rings, and rubbers can then be slid off the rod in a matter of minutes. Another feature is that the main body of the piston never comes in contact with liner surfaces, so that it lasts almost indefinitely. All the wear is absorbed in the rubbers, which are designed for the greatest possible durability. *MacClatchie Manufacturing Co.*



IT'S NEW CHECK IT

38 NEW HANDI-CRANE. This Model UC crane is mounted on a Minneapolis-Moline, Model UTI tractor and has a high lift capacity of 5 tons. The boom is raised and lowered by means of a hydraulic cylinder that allows safe and accurate control independent of any other operation. An 18 or 24-ft. boom rotates a full 320° and has an attached counterweight that permits the load to be swung at a constant radius with absolute safety. Hydraulic stabilizers on the front end provide additional stability when handling loads over the side. It has a short turning radius and a special roller-bearing steering mechanism that permits easy and fast maneuvering even in congested areas. *Clyde Iron Works, Inc.*

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PIPE LINES

Tapline Testing Operations

Testing and filling operations have been in progress for several months on Trans-Arabian Pipe Line Co.'s 1,068-mile crude-oil line from the Persian Gulf to the Mediterranean Sea, and the head of the water slug has passed the Turaif pump station located 822 miles from the initial station at Abqaiq, Saudi Arabia.

The head of the oil stream, which is following behind the water, last week was approaching the Badaha station (mile post 674.5).

The last of the submerged sea-loading lines was successfully launched at Sidon on August 30, and the "golden weld," which linked the two sections, built by Williams Brothers Overseas Co. and International Bechtel, Inc., was made on September 14, thus completing the line in one continuous unit *(The Oil and Gas Journal, October 5, 1950, page 129)*.

New Utility Lines

WASHINGTON. — Extension of its pipe lines costing $1,684,700, will be made by Equitable Gas Co., Pittsburgh, under authorization granted by the Federal Power Commission. The added facilities will connect a new compressor station with the Texas Eastern Transmission Corp.'s trunkline, and with the Pratt and Jefferson storage pools.

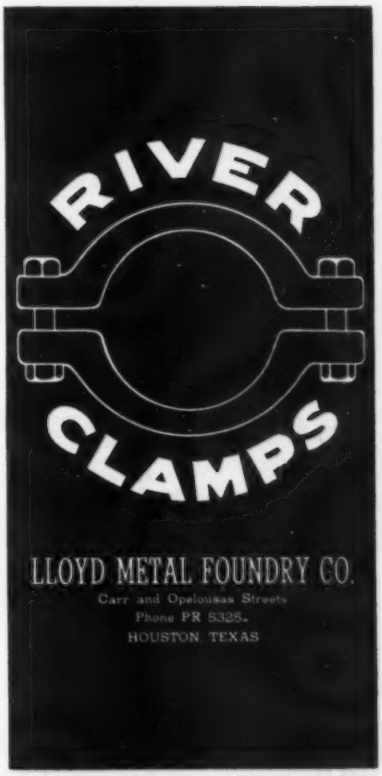
The new pipe-line facilities include 32,200 ft. of 16-in., 4,700 ft. of 12-in., 42,000 ft. of 6-in., and 11,000 ft. of 8-in. pipe line.

In the compressor station near Waynesburg, Pa., four units of 880-hp. will be installed. Three will be used in the winter to relay gas to the company's system, increasing the daily capacity by 21,000,000 cu. ft.

New Ontario Outlet Line

DETROIT.—Contract to lay 61 miles of 16-in. pipe line from Widsor to Dawn Township, Ontario, has been placed with Shaw Construction Co. of Sarna. Activity on the new construction is scheduled to start this week, with completion planned in about 6 months. The new line will provide Union Gas Co. of Canada, Ltd., with natural gas from Texas.

EASY GOING NOW.—After crossing the Tehachapi Mountains of California, pipeline crews of Bechtel Corp. working on Pacific Gas & Electric Co.'s new 506-mile "Super Inch" natural-gas line, are having easy going in the San Joaquin Valley, en route to the San Francisco Bay area. The 34-in. line's route drops 3,700 ft. in a series of ski-slide grades from the Tehachapis down to the valley, where work is now progressing at the rate of 2 miles daily. The artery, originating at Topock, Ariz., is expected to be finished in December, to carry 150,000 M.c.f. daily of gas to the bay area. By January 1952, delivery will be stepped up to 400,000 M.c.f. daily. This photograph was taken on the western side of Bear Valley.



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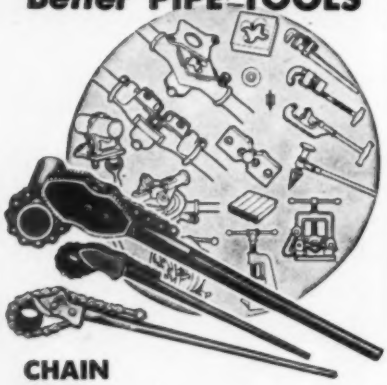

CHAIN TONGS

"Reversible," "Standard" and "Ideal" types in all sizes. Jaws are drop forged from special steel, are carefully milled, heat treated hardened and tested. The *Handles* are forged spring steel. The *Chains* are proof-tested to ⅜ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" Jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

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Sheehan Has Been Active For More Than 40 Years

THE development of Sheehan Pipe Line Construction Co., Tulsa, is the work of three generations. More than 40 years ago, the members of the Sheehan family were engaged together in pipe-laying operations, and few enterprises in pipe-line contracting can look back over such a long history.

History.—In 1904, John B. Sheehan, now manager of the firm, worked with his father, John Sheehan, in the laying of an oil line between Havana and Independence, Kans. The present company may be regarded as growing out of the activities of the elder John Sheehan who operated from Bradford, Pa. After his death in 1921 the business was developed through close association of John B. Sheehan with his brother, Raymond J. Sheehan, who died in 1939.

Operations.—Operations extended over a large area. In 1929 the firm had work under way in Oklahoma, Kansas, Illinois, Alabama and Georgia. Long experience qualified them for handling all sizes of jobs regardless of working conditions.

When Magnolia Pipe Line Co. built the 10-in. crude-oil line in 1939 from Wood River, Ill., to Lima, Ohio, Sheehan crews laid a rough section between the Wabash River and Cicero, Ind. This line was one of the longest laid in the period between the large-scale operations of 1930 and 1931 and the acceleration of pipe-line activity which began shortly after the start of World War II.

J. B. SHEEHAN

In the construction of the Big Inch and Little Big Inch projects of War Emergency Pipelines, Inc., sections for both the crude and products systems were laid by Sheehan. The longest crude-oil system in the postwar period consists of the combined lines known as Basin and Ozark which deliver from Jal, N. M., to Wood River, Ill. An important adjunct of these systems is the 54-mile, 22-in. link laid last year for Texas Pipe Line Co. between Wood River and Patoka, Ill.

This year Sheehan spreads have

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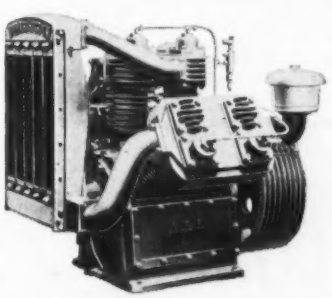

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J. H. NOLAN

R. D. SHEEHAN

been active in building sections for two large projects. In Minnesota they laid for Great Lakes Pipe Line Co. and in Mississippi, Alabama, and Georgia they have been constructing for Southern Natural Gas Co.

Personnel.—Headquarters offices are maintained at Tulsa. At Lawrenceville, Ill., the company maintains shop and warehouse. Executive personnel includes John B. Sheehan, manager, and the two superintendents, Robert D. Sheehan and James H. Nolan. The field superintendents are C. M. Brown and J. W. Brown.

Arkansas Pipe Line Sold

WASHINGTON.—Sale of Arkansa pipe lines, including 26 miles of main line and distribution systems, ha been authorized by the Federal Pow er Commission. MidSouth Gas Co will purchase the utilities from Ar kansas Power & Light Co., both o Little Rock.

The facilities serve communities in eastern Arkansas, crossing Lawrence, Craighead, Independence, Jackson, White, Ashley, Chicot, and Desha counties. The contemplated purchase price will be their depreciated book cost of $1,942,817.94.

MidSouth's authority to transport gas in interstate commerce is limited to the following Arkansas communities: Searcy, Kensett, Judsonia, Bald Knob, Bradford, Batesville, Newark, Newport, Diaz, Tuckerman, Swifton, Jonesboro, Nettleton, Alicia, Hoxie, Walnut Ridge, College City, Wilmot, Parkdale, Eudora, Lake Village, Dermott, and McGehee.

Mississippi Expands Again

WASHINGTON.—Improvements in its pipe-line system costing $5,500,000 will be made by Mississippi River Fuel Corp., St. Louis, in order to increase its flow of natural gas.

Daily capacity will total an additional 60,000,000 cu. ft., giving the system a capacity of 435,000,000 cu. ft. daily.

Additional compressor units will be installed in Arkansas and Missouri totaling 22,000 hp. in eight compressor stations. The firm will also build a new compressor station having 5,500 hp. capacity. The facilities will be used to meet the increasing demands of its existing and authorized customers.

Swampland construction for 20" line in North Louisiana.. by LATEX in 1949.
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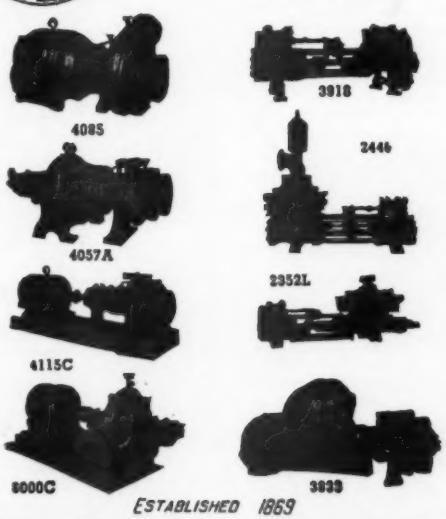

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GROWING FAST

in every direction

Everywhere throughout the vast Cities Service system expansion and growth are in progress. New multi-million dollar refineries and additions are rising against the skyline in Louisiana . . . in Indiana . . . in Oklahoma. Miles of new pipe lines are spanning state after state, linking sources of supply with markets.

Along our country's highways too, the bright familiar sign of Cities Service is going up in front of scores of new service stations. All this growth signals one important fact: The oil industry and Cities Service are moving ahead . . . and keeping ahead of the petroleum needs of industry, the farm, home and the motoring public.

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ON WELL AFTER WELL . . .

PARKERSBURG HYRECO

Continues to make record increases in condensate recovery

The records of field testing are being reproved with every installation. Substantial increases in condensate recovery are bringing new profits to the owners of Hyreco Processing Units . . . are eliminating the expense of down time due to line freezing . . . are obviating the use of heaters and their costly operation.

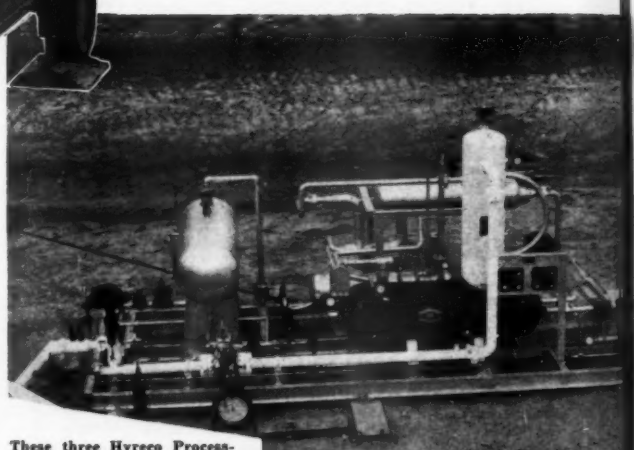
For one user a 15% increase in condensate recovery meant 137 EXTRA barrels of hydrocarbons in 22 days.

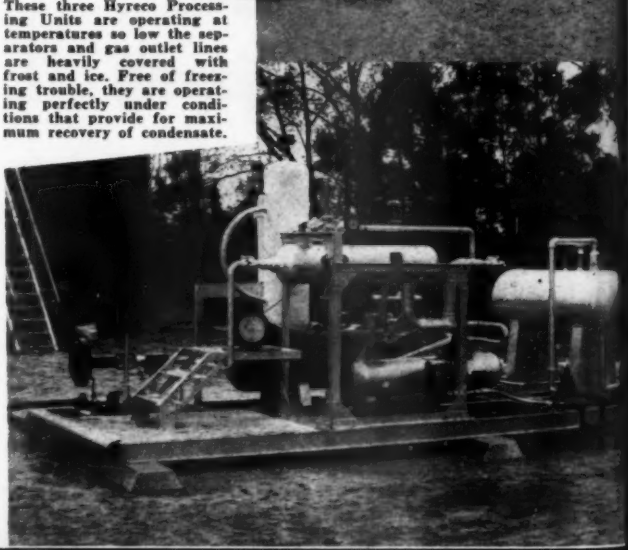
Another owner reports: "Condensate recovery increased from 25 barrels to 31.6 barrels for each million cubic feet gas flowed."

"Net earnings from sale of increased condensate recovery are more than $900.00 per month over that which was possible with conventional installation," reports another Hyreco owner.

Investigate the profit producing performance of Parkersburg Hyreco. Ask your Parkersburg Representative for facts about its proven record. Write for Bulletin HR-650.

5020





These three Hyreco Processing Units are operating at temperatures so low the separators and gas outlet lines are heavily covered with frost and ice. Free of freezing trouble, they are operating perfectly under conditions that provide for maximum recovery of condensate.

PARKERSBURG

RIG & REEL COMPANY • Parkersburg, West Virginia

NATURAL GAS

Gas Storage Increased

WASHINGTON. — Ohio's increase in natural-gas demands has made it necessary for Consolidated Natural Gas Co. to extend its underground-storage fields, and project an expansion program involving $110,000,000 over the 1950-1953 period. Mention of the plans was made in Consolidated's application to the Federal Power Commission regarding a proposed pipe line to the Leidy field. *(The Oil and Gas Journal, September 28, 1950, page 111.)*

To meet the winter demand, Consolidated expects to have 92 billion cubic feet of natural gas in its underground-storage fields. This volume is greater than any yet reported by a gas-utility company. These storage fields are to be substantially increased in the new program. No definite estimate is now given by Consolidated, but the ultimate capacity is expected to be near 125 billion cubic feet of natural gas. A year ago the underground-storage peak was 77 billion cubic feet, representing a 20 per cent increase for the 12-month period.

Consolidated's proven natural-gas reserves in the Appalachian area are reported to be 444 billion cubic feet. Output of the company's Leidy sources is estimated at 60 million cubic feet daily, with probable reserves of 85 billion cubic feet.

Ohio demands are reported so great that Consolidated is restricting new installations for house-heating service. Applications are being accepted from new homes, but the number of conversions where homes have used other fuel will be limited to equal exactly the new home demand.

Consolidated's subsidiary companies expect to service 75,000 more house-heating customers this winter than last, even on the quota basis. Demands for natural gas to present consumers already exceed the theoretical capacity of the system. Demand on a zero-degree day is estimated at 75 million cubic feet above the rated capacity of 1,615 million cubic feet daily.

Michigan Market Refused

WASHINGTON.—Supply of natural gas to Port Huron, Marysville, St. Clair, and other Michigan communities has been denied by the Federal Power Commission.

Southeastern Michigan Gas Co. had petitioned the commission to order Panhandle Eastern Pipe Line Co. to deliver 5,000,000 cu. ft. of natural gas daily into their distribution lines. The commission held that Panhandle had present demands which could not permit the new service.

Milwaukee Wants More Gas

MILWAUKEE.—Addition of 100 new house-heating customers daily has forced Milwaukee Gas Light Co. into a heavy expansion program. The company petitioned the Wisconsin Public Service Commission for permission to issue $36,000,000 of securities.

New installations for home-heating totaled about 9,000 for the first 8 months, with the demand increasing as winter neared. The company expects to have 22,000 space-heating customers by the year's end.

Milwaukee Gas is a subsidiary of American Natural Gas Co. The parent company is supplier of natural gas to the city distribution system.

Montana-Dakota Expands

MINNEAPOLIS.—Natural gas properties of Billings Gas Co. and Rocky Mountain Gas Co. have been acquired by Montana-Dakota Utilities Co., Minneapolis. Gross revenue of the added properties exceeded $1,800,000 for the 12 months ending July.

Distribution systems in Billings, Mont., and 14 communities in the Yellowstone Basin area of South-Central Montana, and in the Big Horn Basin of northern Wyoming are involved. Assets of the newly merged properties also include 190 miles of natural-gas transmission lines, compressor-station facilities, field lines, natural-gas wells, and substantial natural-gas reserves.

Right to Interfere Denied

NEW YORK.—A small New Jersey community was enjoined last week in federal District Court from interfering with construction of Transcontinental Gas Pipe Line Corp.'s 30-in. Texas to New York line.

Alarmed by fears of explosions in the line, officials of Milltown, N. J., last June had the town police prevent a contractor's crew from ditching work along the proposed right-of-way through the borough. The officials cited a zoning ordinance as a basis for their action.

In federal District Court in Trenton, Judge Phillips Forman held that the borough had failed to prove any "hazardous conditions of life in our highly mechanized age," and in an opinion said that the right-of-way selected was one that would cause the least inconvenience and destruction of property.

Bidding for Alberta Gas

OMAHA. — Canadian natural gas from the Alberta fields is being sought as a supply for distribution by Northern Natural Gas Co., according to J. L. Parmelee, exploration manager. Northern hopes to use the natural gas for service in Minnesota and North Dakota markets.

His request was made to the Alberta Petroleum and Natural Gas Conservation Board in Calgary in which he stressed that Alberta natural gas was the logical supply source for the company's markets, being nearer than the Gulf Coast of Texas. In offering to take Alberta natural gas, Parmelee reported that Northern would resist any invasion of its territory by other interests which might plan bringing the Canadian product into the upper Midwest.

The conservation board is considering applications of western pipe lines for a permit to export natural gas to Saskatchewan, Manitoba, and North Dakota.

Light Oil Recovery

PITTSBURGH.—Plants to recover light oil from high-B.t.u. gas oil have been ordered by two Massachusetts gas companies. The chemical-plants division of Blaw-Knox Co. will design and construct the facilities for Cambridge Gas Light Co., Cambridge; and New Bedford Gas & Edison Light Co., New Bedford.

Removal of the light oil eliminates condensation from the gas lines, reducing possibility of service interruption. The process also salvages a by-product of commercial value.

Prices Outrun Hearing

WASHINGTON. — Estimated costs have increased $6,000,000 during the period which the Federal Power Commission has taken to consider proposals for supplying natural gas to areas in South Carolina, Florida, Georgia, and Alabama.

When Atlantic Gulf Gas Co. and United Gas Pipeline Co. first applied for authority to establish the natural gas distributing systems, costs of construction were fixed at $92,000,000.

Southern Natural Gas Co. of Birmingham also applied for authority to make this service. During the months of taking evidence and listening to arguments, Atlantic Gulf finds that costs have so risen that it must now revise its estimates to $98,000,000. The increase was largely due to advancing costs of pipe.

Adequate supply of natural gas for the new market was affirmed by Ralph E. Ewing, Houston geologist, who advised the commission there was "plenty of gas" in the Gulf area to meet all demands.

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Puzzle for experts

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REFINING

Alma Refinery Program

GRAND RAPIDS. — Immediate modernization of the Alma refinery and the construction of new processing equipment for premium gasoline is reported by Mid-West Refineries, Inc., all financing for the expansion having been completed.

The program includes the purchase of a 250-mile pipe line from Ohio to Michigan. Arrangements have been made to acquire the facilities of the Sohio Pipe Line Co. This line will be operated by a new subsidiary, the Michigan-Ohio Pipeline Corp., to be owned 75 per cent by Mid-West and 25 per cent by Sohio.

Africa Seeks Lubricants

WASHINGTON.—Firms in French North Africa have been authorized to buy $600,000 of oil lubricants in the United States. This purchase has been authorized by the Economic Cooperation Administration. The procurement directive has already been issued and names of the firms authorized to transact business are on record at E.C.A.'s office of small business.

Penn Lube Stocks Decline

WASHINGTON.—Seven months of steady decline have nearly halved stocks of Pennsylvania Grade bright oils and viscous neutrals. During August a further decline of 34,455 bbl. was registered, reducing the total to 320,594 bbl.

This decline continues against a rising rate of production. According to the National Petroleum Association, August production was 94,230 bbl. greater than for the same month last year. This was an increase of 22 per cent.

Total stocks of Pennsylvania lubricating oils at the close of August was 516,017 bbl. The July mark was 604,410 bbl., and at the close of August 1949, the total was 988,976 bbl. Output of all lube oils during August was 688,014 bbl., up from 576,092 bbl. in July, and compared with 556,217 bbl. for August 1949.

Refinery Dividends Off

WASHINGTON.—Publicly reported dividends of oil refining corporations in August failed to hit the 1949 level, it was reported this week by the Department of Commerce.

The department found that $9,600,000 was distributed to stockholders during the month as compared with $9,900,000 last year.

Refining corporation dividends for the 3 months ended with August were $159,100,000, or $13,300,000 less than was distributed in the corresponding period last year, the department said.

Joint-Fuels Conference

CLEVELAND.—The thirteenth annual Joint-Fuels Conference of the Fuels Division, American Society of Mechanical Engineers, will be held at the Hotel Statler here October 24-25. The meeting is being held with the cooperation of the Fuels Division, Cleveland Engineering Society.

Panel discussions and papers of interest to the natural-gas and petroleum industries will be presented during the 2-day meeting. Among papers to be presented are: "Gas Analyzers for Better Combustion," by C. H. Barnard, Bailey Meter Co., Cleveland; and "The Causes and Probable Effects of Today's Fuel Situation," by H. A. Baldwin, General Motors Corp., Detroit.

New Refinery Dock

SARNIA, Ont.—Work has started on a new 610-ft. dock for Imperial Oil, Ltd., on the St. Clair River near the company's refinery.

The wharf, to be completed next spring, will have clearance of 26 ft. to accommodate large tankers now under construction at Collingwood and Port Arthur which will handle Alberta crude from the end of Interprovincial Pipe Line Co., Ltd.'s new pipe line at Superior, Wis.

Instrumentation Course

HOUSTON.—John Lynch, president of LaGloria Corp., Corpus Christi, will lead off the fifth annual Texas A. & M. College instrumentation short course October 11-13 with a discussion of "Economics of Instrumentation."

Nine other speakers will address the 3-day meeting which places primary emphasis on applications to continuous-fluid flow processes. Instrument, design, process, and operating engineers from throughout the Gulf Coast and Texas areas are expected to attend. All material to be presented will be on a practical engineering level, according to the college.

Papers to be presented at the meeting include:

Wednesday—"Continuous Analysis," B. W. Thomas, Humble Oil & Refining Co.; "Graphic Panels," Al Novak, E. I. du Pont de Nemours & Co., Inc.; and an address by R. J. S. Pigott, president, Instrument Society of America.

Thursday—"Power Plant Control," B. F.

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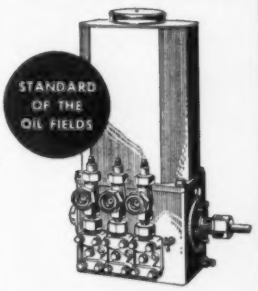

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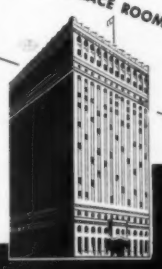

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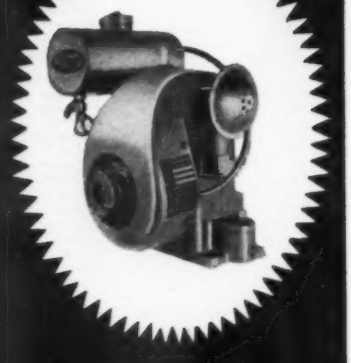

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Friday—"Speed Control and Synchronization of Multi-Unit Gas or Diesel Engine Plants," Homer C. Givens, LaGloria Corp.; and "Unbalanced Values Acting on Control Valve Plugs, and Their Influence on Diaphragm Motor Design," R. A. Rockwell, Mason-Neilan Regulator Co.

Friday afternoon will be given over to a question and answer session presided over by M. K. Anderson, Carbide & Carbon Chemicals Corp.

New Names Recommended

ATLANTIC CITY.—Heavy-duty lubricating oil now covers so many grades that a new system of nomenclature is recommended by the American Petroleum Institute. A panel has been named to study the procedure, headed by Ludlow Clayton, Sun Oil Co.

The Clayton committee will attempt to provide a system of names by which the various qualities can be identified in the market. At present lubricating oils are offered in three types, regular, premium, and heavy duty. Heavy-duty oils have been found to vary so broadly that the one general name is considered inadequate.

New Alkyl Phenol Product

NEW YORK.—A new alkyl phenol has been announced by Jefferson Chemical Co., Inc. Numbered as C-9, it is a mixture of monoalkyl phenols predominantly para substituted. The hydroxyl number is 253. It is a pale yellow liquid possessing a relatively high viscosity and a characteristic phenol odor.

The new product is suggested for use as a nonionic detergent intermediate, in the manufacture of lubricating oil additives, and in the preparation of various resins and plasticizers.

Shale Oil Runs Train

SALT LAKE CITY.—For the first time in railroad history, a train powered by fuel refined from oil shale has been put into operation.

Denver & Rio Grande Western's diesel went into operation last week, carrying 1,250 gal. of the fuel in its three-unit locomotive. This fuel was obtained from 624 tons of shale.

This amount of shale also produced an almost equal amount of gasoline, 6,600 gal. of heavy fuel oil, nearly 7 tons of coke, and other byproducts, according to the U. S. Bureau of Mines, which produced the products at its Rifle, Colo., plant.

The train carried homeward-bound mine officials from the American Mining Congress, which held a 4-day convention here.

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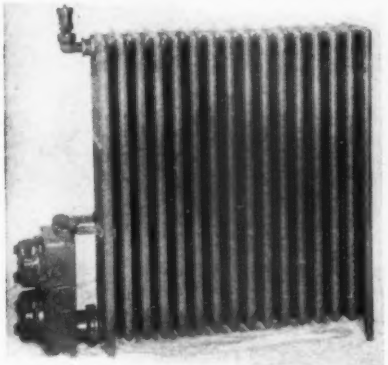

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You get back your investment on one or two jobs!

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For fast, accurate pipe layouts "on the job". With the "CENTER-FINDER", a layout man can mark 4 *equi-distant points* on the circumference of a pipe of *any size* at *any degree at the same time.* . . . Serves as a 360° *protractor* . . . Has 0°-90°-0° *scale* together with a double-reading of 1/2"-*per-foot-pitch scale.* Has SIX 1"x5/16" level vials, and a 1"x9" blade. Weighs only 10 ozs.

MODEL CR "Center Finder" Protractor.. **$24.50**

CENTER FINDER – Pipe Fitters Special

This is similar to the Model CR shown above, except that it has *NO BLADE.* More compact, gets into tight places. Has scale on ONE SIDE only. Six level vials. Weighs 8 ozs.

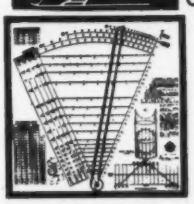
MODEL PF, Pipe Fitters Special, $22.50

"ANGLE METER"

For Pipe Bends up to 126°

GIVES INSTANT TEMPLETS

Direct Readings on to pipe or sheet metal. No calculations required!



The only device of its kind! The Wolfe "ANGLE METER" is the only DIRECT, "ON-THE-JOB" device for making templets or laying out directly on Pipe or Sheet Metal, for Bends up to 126° any diameter pipe. Makes "Y" Layouts; Multi-piece Bends of any number of pieces and degree, any Throat, any Diameter, and gives Starting Line to Rise of Angle Cut; makes Roof-jacks, Angle Iron layouts, etc. Used in leading plants. Angle Meter is 12"x12" overall, sturdy. FLAT model for shop; FOLDING MODEL for field. Specify which.

PRICE: $5.00 Each. Instructive Folder included.

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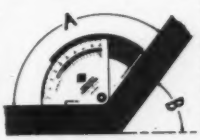

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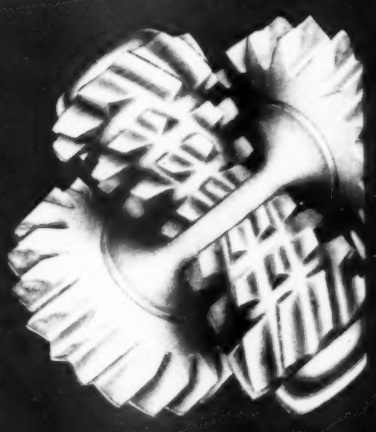

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OIL TOOL CO.

GENERAL OFFICES, EXPORT OFFICE AND PLANT
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PIONEERS OF LONG-TOOTH BITS FOR TOP HOLE DIGGING

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Among the Drilling Contractors

Dallas-Tulsa Men Form Contracting Partnership

H. F. Gibson, Tulsa, and C. I. Holliman, Dallas, have formed a partnership in the drilling contracting business and will operate as Gibson & Holliman. Headquarters are at Dallas, where Holliman will be located. Gibson will maintain offices at Tulsa. A district office has been established at Ardmore, Okla., where Carl Holliday, drilling superintendent, is located.

The new organization has two power-driven rigs, each capable of drilling to 7,500 ft. One currently is running for The Texas Co. in the Boedecker field, Montague County, Texas. The other is on a Magnolia Petroleum Co. job in the West Brock field, Carter County, Oklahoma.

Gilchrist Moves

Gilchrist Drilling Co. has moved its headquarters from Eastland to Abilene, Tex. The company, of which Bob Gilchrist is principal owner, has three rigs operating in the West Central Texas area. James Curry is drilling superintendent, and J. M. Bell, completion supervisor.

Conrad Quits Dallas Firm

Grover C. Conrad has disposed of his interest in the ownership of Oil Well Drilling Co., Dallas, and no longer is connected with the company. Cecil H. Scott, vice president and drilling production superintendent in West Texas, continues in active charge of the company operations with Pat J. Howe as secretary-treasurer.

New Firm Drilling

Alvin S. Nuckolls, formerly a geologist with Carter Oil Co.; W. C. Nuckolls, and C. A. Bell have formed the Nuckolls & Bell Drilling Co. with headquarters at Oklahoma City. The new company is drilling a semiwildcat test for Jones-Shelburne, Inc., in southwestern Payne County, Oklahoma. The operation is at 1 Hastings, NW NW NE 32-18n-2e, ¾ mile west of the Southeast Ramsey pool.

H. O. Grace Drilling Co., Wichita Falls, Tex., is drilling at a wildcat location in the T. King Survey, 2 miles southeast of St. Jo, Montague County, North Texas. Owner of the test is Konrad Sztygold.

Portable Drilling Corp. Tulsa

PROBABLY the only drilling contractor who uses rigs he originated and once manufactured—that's Hugh S. Chancey, owner of Portable Drilling Corp., Tulsa. He was the founder of Unit Rig & Equipment Co., formed in 1935, and head of that firm until he sold his interest in April 1947. His drilling corporation, in its infant stages, was the proving ground for equipment of his manufacturing company. It continues to be a user of this equipment.

Company record. — Organized by Chancey in July 1935, the company has completed its fifteenth year in business. It has expanded steadily with operations now extending throughout most of Oklahoma. Currently, it has six rigs running. In addition to its contracting business, it has producing properties and sizable acreage holdings of its own. It has the distinction of never having lost a hole, or drilling well, it started.

Scope. — Portable has an almost completely integrated set-up. It has its own modern drilling-in cable-tool units, bulldozers, trucks, including the biggest tandems, and other auxiliary facilities. It also has its own mechanics who do most of the maintenance work on its drilling rigs and other equipment. Its field headquarters at Seminole, located 1½ miles south of the town on State Highway 99, are of the most modern and complete nature. They include office facilities, a large garage, warehouses and yards.

Executive personnel.—Executive officials include Chancey, as president and general manager; Felix A. Bodovitz, vice president and general counsel; and W. Boyce White, assistant manager and secretary. Chancey's oil-industry experience extends for a period of more than 30 years. He started in Desdemona and Ranger and since has worked in many areas of Texas, Oklahoma, and Louisiana. He came to Tulsa in February 1934. White, who has been with the company since 1940, has been in the oil

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business since 1920, his first employment being with the old Roxana Petroleum Corp., now Shell Oil Co.

Key operators.—Key operating personnel includes M. H. (Bill) Brown, drilling superintendent; Lawton T. (Dutch) Couch, senior toolpusher, Seminole; Harold Hickman, toolpusher in charge of rigs running in Garvin County and southern Oklahoma; and Perry E. (Chuck) Morris, production department, Seminole.

Brown joined the company early this year, coming from Parker Drilling Co. Previously, he had been with Loffland Brothers Co. for many years, starting on that company's No. 3 rig at Tonkawa in 1925. Couch, who "cut his teeth" on a rotary rig at Lawton, Okla., in 1920, has been with the company since February 1938. Hickman has had more than 20 years' experience as roughneck, driller and toolpusher, working for various major contractors in Oklahoma, Louisiana, Texas and other states. Morris has had more than 23 years' oil-field experience, being associated in turn with Ramsey Petroleum Co. and Sunray Oil Corp. before joining Portable.

Other offices.—The company maintains offices at Oklahoma City where Howard E. Bradley is business representative. Prior to joining Portable, Bradley was associated with Phillips Petroleum Co. and has been engaged in various phases of the oil business in the Mid-Continent area since 1924. He was one of the organizers of the Central Oklahoma Chapter of the American Petroleum Institute.

Ard Drilling Co., Abilene, Tex., is the contractor on Stanolind Oil & Gas Co.'s latest test started in the J-Y field, Kings County, West Texas. The new well, 7 Masterson, F. P. Knott Survey, is a west offset to Stanolind's 2 Masterson, Canyon Reef discovery well.

Bell & Burden, Inc., Los Angeles, will drill British-American Oil Producing Co.'s new wildcat location in the North Santa Cruz area, Santa Cruz County, California. It is 1 Gairaud, 18-9s-2w.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 10-2-50	Change week ended 9-25-50	Change week ended 10-3-49
Gulf Coast	528	+ 5	+ 28
W. Tex.-N. M.	776	+18	+196
Ark.-N. La.-E. Tex.	141	— 7	— 18
Oklahoma	278	+10	+ 46
Kansas†	140	+ 2	+ 13
Illinois-Eastern	136	+ 5	+ 15
Rocky Mountains	123	0	+ 15
Pacific Coast	145	+ 2	— 1
Total U. S.	2,267	+35	+294
Western Canada	105	+ 1	+ 42
Total	2,372	+36	+336

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the West Texas-New Mexico and Oklahoma-Kansas areas are shown by charts on pages 166 and 167. †Includes Nebraska and Iowa.

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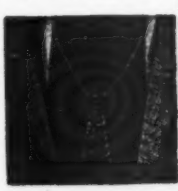
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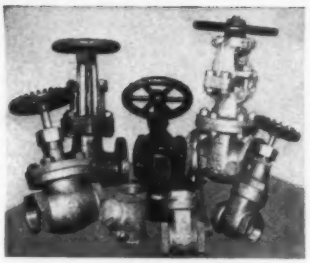

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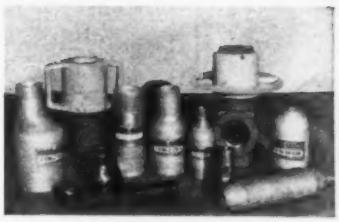

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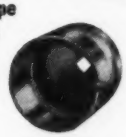

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Lighter weight. The new No. 218-P Pump weighs only 31,000 pounds which brings the weight per horsepower to less than 70 pounds.

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New in design and construction, the No. 218-P presents . . . besides many distinct advantages . . . the same efficient, trouble-free performance and low operating costs common to all "Oilwell" power slush pumps.

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FLUID SUCTION CONNECTION (10" x 17½" Ser. 300 Companion Flange) PIPE SIZE.....	10"
FLUID DISCHARGE CONNECTION: Air Chamber (4" x 10¾" Series 600 Companion Flange) PIPE SIZE.....	4"
OIL CAPACITY .....gallons	48
WEIGHT (Mounted on Short Structural-Steel Skid Base)	
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USS "OILWELL"

UNITED STATES STEEL

Palo Duro Basin Warrants Attention

LEASING activity in the counties of the Palo Duro basin in the southern portion of the broad Texas Panhandle has been gradually accelerating during the past couple of years until recently it has reached near-boom conditions. Deaf Smith, Castro, Randall, Swisher, Armstrong, Briscoe, Donley, and Hall counties, all of which lie wholly within the limits of the Palo Duro basin, have been heavily leased.

What's behind this activity in an area that hasn't produced a drop of oil nor even had any encouragement worthy of mention in wildcat tests? Principally it is the idea that the shale basin should contain oil-bearing reef buildups of lower Permian-Wolfcamp or upper Pennsylvanian age similar to those now being discovered and exploited in the Permian basin which lies to the south. However, the possibilities of finding oil in the Palo Duro basin are not limited to reefing. On the east side of the basin, especially, there are indications of excellent possibilities of finding oil in Permo-Pennsylvanian, Pennsylvanian, or even pre-Pennsylvanian rocks on structure or in porosity wedges.

It is probable that the only reason that there are no oil fields in the Palo Duro basin is that there haven't been enough deep wildcats drilled. There have been no geologically deep tests in Briscoe County, though there is a well now drilling that may be taken to the pre-Cambrian, only one in Swisher County, and two in Castro County. It is also possible that oil-bearing reef buildups have been passed up in some of the deep wildcats.

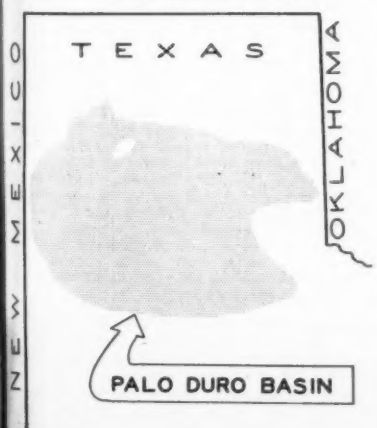
The Palo Duro basin is the area of thickest deposition of Permian and pre-Permian sediments (up to a known thickness of nearly 11,000 ft.) in the geological province called the Northern Llano Estacado, which includes the northeast corner of New Mexico as well as the southern portion of the Texas Panhandle. The stratigraphic units of the Palo Duro basin have been tentatively correlated with those of the better-known Permian basin and North Texas areas and given the names used in these areas.

The basin is bounded on the north by the Amarillo granite ridge on which the enormous Panhandle oil and gas field is located. This field has an estimated ultimate recovery of at least a billion barrels of oil and is a significant portion of the most important natural-gas reserve thus far developed in the world. Panhandle field produces from Permian rocks primarily but there is also production from Pennsylvanian horizons and fractured pre-Cambrian basement complex.

The Palo Duro basin is bounded on the south by the Matador "arch," which now appears to be a series of widely spaced small structures rather than a continuous arch as once believed. It is this series of highs that divides the Palo Duro and Permian basins. On the arch is Anton-Irish, a 20-million-barrel pool, which produces from the Permian-Clearfork-Wichita. Lutrick, a one-well pool surrounded by dry holes; Petersburg; West Petersburg, and Arick are evidently associated in some way with the arch but, because they produce from Pennsylvanian (probably Cisco) reef buildups, may be considered as being on the edge of the basin rather than on the arch.

In addition to the Briscoe County well mentioned above there are two other tests in the area that are being watched with considerable interest. In Childress County off the southeast edge of the Palo Duro basin proper, but within the area usually referred to as Palo Duro, Pure Oil Co. is going in an abandoned hole to check the possibility of finding an oil-bearing horizon passed up when the hole was originally drilled. In the same county, 4 miles north, a wildcat slated as a 7,000-ft. test is being started.

Philip C. Ingalls



HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTHWEST TEXAS.—H. R. Smith and American Republics Corp. have a dual oil and salt dome discovery at their 1 J. C. Dilworth, Jr., wildcat in the Rafael Vasquez Survey 42, McMullen County. The test drilled to a depth of 8,088 ft. in a salt mass topped at 7,650 ft., then plugged back and set production string at 5,002 ft. Oil flowed at the rate of approximately 100 bbl. per day through perforations at 4,929-34 ft. (See Corpus Christi report for details.)

WEST TEXAS.—Star Oil Co. 1 Mrs. Blanche Young, southwest Kent County wildcat near the Garza County line, flowed oil on its first drill-stem test in the Ellenburger at 7,786-7,822 ft. Duration was 1 hour and 25 minutes. Gas surfaced in 6 minutes and oil in 90 minutes. It flowed into pits for 5 minutes, with no estimate on recovery, then the tool was closed and operators started coming out of the hole. There was no water. On elevation of 2,322 ft., top of the Ellenburger was 7,787 ft.

ROCKY MOUNTAIN AREA.—A. L. Schlaikjer et al. 1 Darlington, west of Mush Creek and southwest of Fiddler Creek, Weston County, Wyoming, is reported flowing 300 bbl. of oil daily from Newcastle sand, indicating better sand development toward the basin area than previously found in other wells in the area.

North Central Texas

Six Counties Report Discovery Prospects

WICHITA FALLS.—Six counties, Throckmorton, Stonewall, Baylor, Wise, Archer, and Jack, in north and west central Texas reported new discoveries in the completion stage, or to have wells showing for discoveries.

In southeastern Throckmorton County, Warren Oil Corp. 1 Mathews Unit topped the Mississippian limestone at 4,403 ft., drilled to 4,415 ft., then placed 20 shots in open hole from 4,405 ft. to total depth. After a small acid treatment the well kicked off and flowed 140 bbl. of 43°-gravity oil in 9 hours, then flowed 154 bbl. of oil in 24 hours through 7/64-in. choke. On completion potential, through 16/64-in. choke, the well gaged 435 bbl. of clean oil daily, flowing under tubing pressure of 590 psi.

Twelve miles southeast of Aspermont in Stonewall County, Montray-Moore Drilling Co., of Abilene, 2 W. J. Bryan, ran a 3-hour drill-stem test in the Swastika section from 3,658-65 ft. Gas showed in 15 minutes and oil flowed in 2 hours and 13 minutes. It was allowed to flow into pits for 45 minutes, with no estimate made on the production. Recovery in drill pipe was 2,840 ft. of clean oil, plus 160 ft. of heavily oil and gas-cut drilling mud. Open flowing bottom-hole pressure was 830 psi. Operators set casing at 3,662 ft. and were to attempt completion from 3 ft. of open hole.

Helmerich & Payne, Inc. 1 Hardison, Baylor County strike located about 14 miles east of Seymour, was completed flowing 200 bbl. of oil in 3 hours, and was given a daily potential of 1,600 bbl. of 41°-gravity oil. Production was from open hole in the Ellenburger, said to be the county's first such production, at 5,302-14 ft. Nearest production to Helmerich & Payne's discovery is shallow oil 3 miles southwest in Rendham pool. Caddo and Canyon limestone production is about 5 miles northwest of Turbeville field.

New Bend conglomerate production for northwest Wise County, and 4 miles north of Chico field, producing from the same structure, was in sight at Cities Service Oil Co. 1 Zeldin. First two drill-stem tests from 5,717-36 and 5,767-83 ft. recovered only gas, but a test from 5,781-5,809 ft. had gas at the surface in 11 minutes, estimated close to 1,000,000 cu. ft. daily, and in 90 minutes recovery was 180 ft. of oil. The well did not flow on the test. Operators were running casing to 6,004 ft. for completion. Cities Service was said to hold a checkerboard spread around the new well of about 1,200 acres.

In southeastern Archer County, Henry Grace Production Co. 2 W. E. Bailey, completed flowing 53 bbl. of 40°-gravity oil in 6 hours and was given a calculated daily potential of 212 bbl. Pay section was Strawn sand from 3,356-69 ft. The new discovery, or extension to DeMoss Strawn field, is separated from that area on the northeast by a dry hole and is nearly 1 mile west of production on the south edge of the same field.

Southeastern Jack County had prospects of new Strawn sand production, on the basis of a series of drill-stem tests, at Warren Oil Corp. 2 Billie Yates. Top of the Strawn was called at 4,154 ft., and first test made at 4,166-78 ft. which recovered some distillate and had gas estimated at 2,000,000 cu. ft. daily. First oil recovery was from 4,178-88 ft. On a 2-hour test at that interval, gas came to the surface in 4½ minutes and oil sprayed out in 55 minutes. Recovery was 80 ft. of clean oil plus 5 ft. of heavily oil and gas-cut mud. Bottom-hole pressure was 1,200 psi. in 20 minutes. Further testing recovered more oil from 4,188-98 and 4,198-4,208 ft. Last test from 4,208-18 ft. had only gas and some oil-cut mud. Estimated base of the Strawn was 4,215 ft., and top of the Caddo lime was placed at 4,764 ft. Drilling continued at 5,025 ft. on a 6,700-ft. contract.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Coleman County: Ren-Cro Oil Co. and Roswell Oil Co. 2 W. B. Griffin, Blk. 8, King & Gilbough Addn., HT&B Sur. 57, Santa Anna townsite, TD 1,826 ft., pay 1,802 ft., flowed 168 bbl. of 43°-gravity oil a day, 13/64-in. choke, GOR 375 cu. ft., CP 575 psi., TP 300 psi.

Cooke County: Sussex Oil Co. 1 A. E. Leslie, John English Sur., A-345, 6 mi. NE St. Jo, TD 2,420 ft., Strawn oil sand 2,406 ft., flowed 139 bbl. 40°-gravity oil in 12 hr., 17/64-in. choke, GOR 500 cu. ft., CP 210 psi., TP 95 psi.

Eastland County: Deep Rock Oil Corp. 1 Eva Davis, Spires Dooley Sur., A-77, 4 mi. SE Ranger, TD 3,660 ft., PB 3,625 ft., elev. 3,292 ft., Ranger sand 3,322 ft., perf. 3,320-32 ft., 5,700,000 cu. ft. gas a day, SIP 770 psi.

Haskell County: Anderson Prichard 1 A. J. Sanders, D. I. Woodlief Sur. 122, A-410, 2 mi. S Weinert, TD 5,910 ft., elev. 1,535 ft., pay 5,434 ft., perf. 5,434-45 ft., pumped 9 bbl. 40°-gravity oil a day, plus water.

Taylor County: Kemp Drilling Co., Inc., 1 E. L. Young, 266-64-H&TC, 10 mi. NW Ovalo, TD 4,606 ft., Strawn pay 4,588 ft., perf. 4,590-96 ft., flowed 126 bbl. 42°-gravity oil in 4 hr., 28/64-in. choke, GOR 514 cu. ft., CP 695 psi., TP 175 psi.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Fortex Oil Corp. 1-B Parkey, Hooper & Wade Sur., A-189, 6 mi. SE Dundee, dry, TD 1,632 ft.

Baylor County: J. J. Lynn 1 M. J. Gist, Sec. 209, T&NO Sur., A-361, 10 mi. E Seymour, dry, TD 5,285 ft., Caddo 5,195 ft.

Clay County: Continental Oil Co. 1 J. F. Huckaby, Lot 8, Orange CSL, A-368, 3½ mi. S Henrietta, dry, TD 6,374 ft., Caddo 5,942 ft.

Frank Wood 2 A. C. Douthitt, Parker CSL, Sec. 41, 4 mi. SE Petrolia, dry, TD 2,005 ft., elev. 931 ft., conglomerate 1,980-2,005 ft.

Coleman County: DeSoto Oil Co. 1 B. M. Smith, L. O. Burford Sur., 1 mi. W Goldsboro, dry, TD 4,005 ft., elev. 1,957 ft., sand 3,938 ft.

Cooke County: E. C. Johnston 1 Adolph Fuhrman, H. Wikley Sur., A-1090, ½ mi. NW Lindsay, dry, TD 2,170 ft.

E. C. Johnston 1 J. N. Hacker, J. Rose Sur., A-843, 1½ mi. S Lindsay, dry, TD 1,860 ft.

Voth Bros. Drilling Co. 1 Streng, SPRR Sur., A-975, 7 mi. SW Muenster, dry, TD 2,889 ft.

Fisher County: Trinity Production Co. 1 J. P. Maberry, A. A. Spring Pre-Emption Sur., 2 mi. SE Sylvester, dry, TD 3,346 ft.

O'Brien Petroleum Corp. 1 R. W. Cole, WCRR Sur. 2, 2½ mi. SW Rochester, dry, TD 5,200 ft., elev. 1,584 ft., Strawn sand 4,897-4,923 ft.

Foard County: Cities Service Oil Co. 1 Johnston "J," 8-A-SPRR, 7½ mi. W Crowell, dry, TD 7,448 ft., elev. 1,734 ft., Wichita-Albany 1,130 ft., Cisco 2,950 ft., Strawn 5,209 ft., Chester 7,162 ft., Chappel 7,190 ft.

Jack County: Forest Oil Corp. and Streeter Oil Co. 1 A. N. Patton, Rebecca Parker Sur., A-461, 2 mi. NE Antelope, dry, TD 2,154 ft.

Prince Bros. Drilling Co. 1 R. H. Mower, J. W. Buckner Sur., A-33, 1 mi. NE Jacksboro, dry, TD 5,742 ft., elev. 1,041 ft., Caddo lime 4,793-4,805 ft.

Jones County: Ungren & Frazier 3 J. L. Culbertson, Sec. 6, GH&H Sur., 5 mi. E Hamlin, dry, TD 6,019 ft., Mississippian 5,845 ft., Ellenburger 6,002 ft.

Knox County: Continental Oil Co. 1 R. C. Hamilton, 57-13-H&TC, 6 mi. NW Knox City, dry, TD 6,235 ft., Canyon lime 3,761 ft., Ellenburger 6,135 ft.

Lampasas County: Linda Petroleum Co. 1 Holley, Sec. 15, HT&B Cur., 3 mi. N Adamsville, dry, TD 2,723 ft., elev. 1,775 ft., Ellenburger 2,657 ft.

Nolan County: R. W. Sutton 1 Seago, 43-22-T&P, 3 mi. W Sweetwater, dry, TD 476 ft. in shale.

Shackelford County: L. A. Warren Drilling Co. 1-B T. W. Lee, 31-11-T&P, 4 mi. SW Albany, dry, TD 1,225 ft.

Stonewall County: Rowan & Hope 1 Catherine Berry, 217-D-H&TC, 8 mi. N Swenson, dry, TD 6,703 ft. in sand, elev. 7,747 ft., reef 5,315 ft., Ellenburger 6,480 ft., Hickory sand 6,660 ft.

Wichita County: Fortex Oil Corp. 1 Wm. Lalk, Blk. 272, Waggoner Colony Sur., 5 mi. NE Electra, dry, TD 2,202 ft.

Wilbarger County: W. H. Peckham et al 1 Karcher, 2-9-H&TC, 9 mi. SW Vernon, dry, TD 4,008 ft.

Wise County: Standard Dryer Drilling Co. 1 Mrs. M. D. Cansler, J. W. Haynes Sur., A-425, 2 mi. SW Paradise, dry, TD 7,330 ft., elev. 830 ft., Caddo 4,370 ft., Ellenburger 7,124 ft.

Young County: Star Oil Co. 1-B DeWitt McCaltchey, Sec. 172, TE&L Sur., A-419, 3 mi. W Olney, dry, TD 1,152 ft.

Appalachian Field

Maryland Gets First Sizable Gas Well

PITTSBURGH.—In Garrett County, Maryland, Columbian Carbon Co. 1-GW-1502 N. K. Welch, originally scheduled for a deep test, was completed in a shallow formation, resulting in a large flow of gas. The final test was 8,029,000 cu. ft. per day with an original rock pressure of 1,610 psi. The first gas was struck at 2,846 ft. and the well was completed at a depth of 2,869 ft., with gas increasing to this depth.

Previous production was established for the state in the same county in November of last year when Cumberland & Allegheny Gas Co. brought in its S-424 E. N. Beachy. However, this successful wildcat gaged only some 581,000 cu. ft. of gas Located in Ryans Glade No. 8 district, it produced from chert at 4,454-56 ft., and was bottomed at 4,910 ft.

North Central Pennsylvania.— In Leidy Township, Clinton County, Noyly Development Co. completed 1 J. C. McCoy, elevation 957 ft., gaging 16,500,000 cu. ft. of gas. Rock pressure was 3,850 psi. Oriskany sand was topped at 5,676 ft. with gas at 5,677 ft. Total depth was 5,677 ft. Two new wells are under way in this area: Shaw & Smith 1 Pat Foley estate, on the Tamarack Quadrangle, and Dorsey Calhoun 1 Leah Calhoun, on the Hammersley Fork Quadrangle.

West Virginia.—In Steele district, Wood County, W. & B. Gas Co. 1 Elbert & Myrtle Hale, elevation 738 ft., resulted in a dry hole. Corniferous lime was found at 4,765-4,877 ft., and Oriskany sand at 4,877 ft. Total depth was 4,906 ft. Columbian Carbon Co. 1-1157 Earl Ryan et al, elevation 830 ft., is drilling at 2,479 ft.; Hope Natural Gas Co. 9468 Frank Gilmore, elevation 827 ft., drilling at 1,925 ft. and 9471 Maggie Ludwig, elevation 728 ft., drilling at 1,973 ft.; Glen W. Roberts 1 Robert W. Ayers, elevation 985 ft., drilling at 2,020 ft.; United Carbon Co. 1-1740 Wattie R. Ayers, elevation 846 ft., ran 10-in. casing at 1,230 ft. In Tucker district, Wirt County, Godfrey L. Cabot, Inc. 1-1328 fee (W. T. Gant tract), elevation 763 ft., is drilling at 4,776 ft.; Louis E. Reed 1 Earl Tanner, elevation 1,056 ft., drilling at 4,850 ft. In Tolcott district, Summers County, Godfrey L. Cabot, Inc. 1-1330 S. H. Pence, wildcat, elevation 1,799 ft., is drilling at 1,026 ft.

MARYLAND SUCCESSFUL WILDCAT

Garrett County: Columbian Carbon Co. 1-GW-1502 Welch, 8,029,000 cu. ft. of gas at 2,846 ft., TD 2,869 ft.

WEST VIRGINIA WILDCAT FAILURE

Wood County, Steele district: W. & B. Gas Co. 1 Hale, elev. 738 ft., dry, TD 4,906 ft.

Texas Gulf Coast

New Area Apparent In DeWitt County

HOUSTON.—A new oil discovery is indicated in DeWitt County at Shell Oil Co. 1 Gohlke Heirs, 7½ miles northeast of Thomaston in the T. J. Thigpen Survey, Abstract 614. On drill-stem test made at 8,122-42 ft., through ¾-in. chokes, recovery was 59 bbl. of oil plus 20 ft. of muddy water in 20 minutes. Working pressure was 112 psi. and bottom-hole pressures were 2,875 psi., open, and 3,575 psi., closed. Several other tests had been made previously with the following results: 8,107-42 ft., recovered oil; 8096-8,103 ft., recovered gas-condensate; 8,113-23 ft., recovered oil; 8,107-13 ft., recovered oil; 8,096-8,103 ft., recovered condensate. This is a rank wildcat in the east corner of DeWitt County, which promises to open a new producing territory.

McCarrick Oil Co. 1 Mary Sullivan, gas-condensate well in East Maxine area of Live Oak County, 8 miles northwest of George West, has been gaged on dual completion in the 7,160-ft. and 7,260-ft. sands of the Wilcox series. Through perforations at 7,160-70 ft. and 7,173-79 ft., the well flowed an estimated 31,000,000 cu. ft. of gas per day on open flow. Production from perforations at 7,260-70 ft. was estimated at 24,500,000 cu. ft. of gas per day on open flow. Operators are now waiting on potential gage.

Morris Cannan continues to test his 1 Pedro Pardo, new oil discovery in Victoria County, 1¼ miles southwest of Cologne field. Through 7/64-in. choke, the well flowed 100 bbl. of oil per day through perforations at 4,756-62 ft. on latest test. Tubing pressure varied from 940 to 1,180 psi., casing sealed.

Texas Co. opened new pay in Port Neches field, Orange County, at its 30 H. J. Kuhn et al, Mary A. E. Hull 2 Survey. On potential test the well flowed 126 bbl. of 22.4°-gravity oil per day through perforations at 4,072-78 ft., using 9/64-in. choke.

New pay has been opened in Nona Mills field, Hardin County, at Newton & Feland 1 Taylor estate. The well came in flowing 221 bbl. of 27.8°-gravity oil daily through 10/64-in. choke. Production is through perforations at 7,173-75 ft. Location is in the Hardin County School Land Survey.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Brazoria County: Humble Oil & Refining Co. 1 Danbury Gas unit, Henry Austin League 5, A-13, 1 mi. S Danbury field, TD 11,245 ft., perf. 9,275-96 ft., 23,000,000 cu. ft. of gas per day, no gage on condensate.

Live Oak County: McCarrick Oil Co. 1 James D. Sullivan et al, Simmons Subd., 8 mi. NW George West, 2½ mi. NE Maxine field, TD 7,285 ft., perf. 7,260-70 ft., 24,500,000 cu. ft. of gas per day, open flow, SIP 2,660 psi.; perf. 7,160-79 ft., 31,000,000 cu. ft. of gas per day, open flow, SIP 2,640 psi.

Sunray Oil Corp. 1 J. C. Dillworth, Refugio County School Land Sur., A-398, 5 mi. NE Oakville, TD 7,656 ft., perf. 7,545-57 ft., 2,600,000 cu. ft. of gas per day, 64 bbl. condensate, 14/64-in. choke.

Orange County: Texas Co. 30 Harry J. Kuhn, Mary A. E. Hall 2 Sur., A-431, TD 6,415 ft., perf. 4,072-78 ft., 126 bbl. oil per day, 9/64-in. choke, TP 300 psi., gravity 22.4°.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Austin County: N. L. Causey 1 Ernest C. Steck, J. Flanakin Sur., Sec. 10, A-39, 5 mi. N Sealy, dry, TD 6,507 ft.

Brazoria County: Amerada Petroleum Corp. C-2 State Tract, State Tract 8, Bastrop Bay, 13½ mi. NE Freeport, dry, TD 7,311 ft.

Fayette County: D. J. Moss 1 Mrs. Meta

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Gray, Samuel Millet League, 3 mi. N Cistern, dry, TD 1,762 ft.

Galveston County: Stephens Petroleum Co. 1 Ruggles et al, S. C. Bundick Sur., Lot 20, dry, TD 7,575 ft.

Jasper County: S. A. Brewster and W. O. Bartle 1 C. A. Withers et al, R. M. Williamson Sur., A-516, 6 mi. NW Buna, dry, TD 10,500 ft.

Walker County: R. J. Caraway 1 Samuels & McAdams Bros., J. J. Holcomb Sur., A-239, 16 mi. NE Huntsville, dry, TD 3,889 ft.

Wharton County: Smith & Smith et al 2 S. L. Ray, S. F. Austin League, near Boling Dome, dry, TD 874 ft.

Louisiana-Arkansas

DeSoto Parish Wildcat Testing Paluxy Sand

SHREVEPORT.—Lyons, Prentiss & McCord 1 Sue Chaffin, 4-1n-14w, De Soto Parish wildcat, has indicated a commercial producer. With total depth at 3,301 ft., 5½-in. casing was set at 3,000 ft. and perforated at 2,948-52 ft. opposite a 4-ft. Paluxy oil sand. The well swabbed for a short time at an estimated rate of 20 bbl. daily. Then, while waiting on concrete for pumping unit to set, the well began to flow. It flowed 55 bbl. of clean oil daily by heads through a ¼-in. tubing choke with flowing pressures of 85 to 100 psi.

Continental Oil Co. 1 Wideman, NW SE 21-21n-7w, Claiborne Parish, is bottomed at 8,734 ft. Operator is preparing to set casing to test numerous slight odors and stains of oil in the Cotton Valley and Smackover lime horizons. This well is a deep test on the east flank of the old Homer field. It found the top of the Cotton Valley at 5,805 ft. and the top of the Smackover at 7,456 ft. Salt was encountered at 8,730 ft.

Don D. Montgomery 1 May-Dunlap, NE NE 35-17n-9e, Richland Parish, 1 mile south of production in Delhi pool encountered 16 ft. of effective oil sand from 3,740-62 ft. in the Tuscaloosa. This sand is believed to be a stray from the massive Tuscaloosa. During a 10-minute drill-stem test from 3,748-70 ft. with ½-in. top and ¾-in. bottom chokes, 1,050 ft. of clean oil was recovered. Bottom-hole flowing pressure was recorded at 1,525 psi. and the shut-in bottom-hole flowing pressure at 1,875 psi. The top of the Paluxy was found at 3,829 ft. Casing has been set at 3,789 ft. in this well which was bottomed at 4,007 ft. and operator is preparing to test.

Justiss-Mears Oil Co.'s wildcat at Cotton Island, 20 miles north of Alexandria, Rapides Parish, was reported to be making approximately 50 bbl. of oil a day from the Sparta formation around 2,430 ft. Location of the new shallow discovery in 27-6n-2w is about 10 miles from nearest oil production in Big Island field.

NORTH LOUISIANA SUCCESSFUL WILDCAT

LaSalle Parish: Placid Oil Co. 129 La Central Lumber Co., C NE NW 12-9n-2e, extension to Olla pool, 132 bbl. of oil per day, perf. 3,349-54 ft. and 3,168-73 ft., 10/64-in. tubing choke, FTHP 300 psi., TD 3,361 ft., Wilcox 1,655 ft.

NORTH LOUISIANA WILDCAT FAILURE

Claiborne Parish: Ray & Wolf 1 K. R. English, 8-21n-5w, dry, TD 5,820 ft.

ARKANSAS WILDCAT FAILURE

Miller County: C. A. Mohnkern 1 Chas. Ross, 15-14s-27w, dry, TD 5,496 ft., tested salt water from perf. 3,115-18 ft.

N. H. Wheless Oil Co. 1 D. B. Wood, 5-18s-28w, dry, TD 5,200 ft., elev. 262 ft., base annona 2,660 ft., top Paluxy 3,840 ft. by samples.

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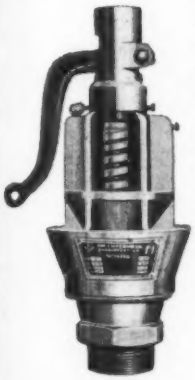

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Kansas

Nemaha County Wildcat Shows for Oil Producer

CARTER OIL CO. 1 O. Strahm, NW SW NW 13-2-14e, prospective pool-opener in Nemaha County, in the Forest City Basin, in the northeastern part of the state, swabbed at the rate of 20 bbl. of fluid per hour following a 1,200-gal. acid treatment while testing Hunton lime, in which casing is perforated at 2,826-36 ft. Hole, now with plug set at 2,836 ft., had been drilled to the Arbuckle logged at 3,809-3,929 ft. (surface elevation 1,252 ft.). Top of the Hunton is 2,825 ft. (—1,573 ft.).

The location is 3 miles northeast of Carter's Strahm pool, discovered in 1948, and in which two wells have been completed, one (the discovery well) in Hunton lime, and the other in Viola lime.

Skelly Oil Co. 1 Ferron, NW SW NE 11-11-11e, which recently opened another new Forest City Basin pool in northern Wabaunsee County, has established a daily potential of 254 bbl. of oil from Viola lime at 2,901-04 ft. (—1,773-76).

Lindas Oil Co. has completed its 1 Schmid, NW NW NW 7-17-14, northwestern Barton County, with a pumping potential of 91 bbl. daily, opening a new producing area 2 miles from nearest other production, the Axman pool to the south. Production is from Arbuckle lime, topped at 3,464 ft. (—1,493 ft.) and drilled to 3,469 ft.

The second pay zone for the recently opened Dell pool in northern Stafford County has been proved with the completion by Petroleum, Inc., of its 1 Hall, SE SE SW 7-21-13, in Arbuckle lime. The well pumped 29 bbl. of oil daily on potential tests with the pay zone at 3,635-40 ft. (surface elevation 1,917 ft.). The well is ¾ mile south of the discovery well, completed last June in Lansing-Kansas City lime. The latter well, 1-B Brown, was drilled to the Arbuckle but failed to find production in it.

The abandoned Bruce pool in northern Cowley has been reopened with completion by E. B. Shawver and associates of their 1 Davis, NE NE NW 9-30-4e, pumping 40 bbl. of oil daily from Arbuckle lime at 3,305-13 ft. Hole is open below 3,306 ft.

KANSAS SUCCESSFUL WILDCATS

Ellis County: Texas Co. 1 Fries, SE SE NW 10-12s-20w, elev. 2,198 ft., pumped 25 bbl. of oil per day from Arbuckle at 3,908-19 ft., TD; anhydrite 1,597 ft., Topeka 3,260 ft., Heebner 3,487 ft., Lansing-Kansas City 3,528 ft., Sooy 3,846 ft.

Derby Drilling 1 Jacobs, NW NW SW 21-13s-17w, elev. 2,014 ft., pumped 126 bbl. of oil per day from 3,391-99 ft., TD 3,713 ft., anhydrite 1,240 ft., Heebner 3,264 ft., Lansing-Kansas City 3,304 ft., Sooy 3,568 ft.

Graham County: Jones-Shelburne & Farmer 1-A Sutor, SW SW NE 2-10s-21w, elev. 2,284 ft., pumped 3,000 of oil per day from Arbuckle at 3,837-48 ft., TD; anhydrite 1,750 ft.

Phillips County: Maxwell et al 1 Boere, NW SW NE 33-1s-18w, elev. 2,265 ft., pumped 210 bbl. of oil per day from Lasing at 3,505-13 ft., TD 3,575 ft., anhydrate 1,680 ft., Heebner 3,426 ft., Lansing-Kansas City 3,454 ft.

KANSAS WILDCAT FAILURES

Cowley County: Sohio and Ecklund 1 Williamson, SE NE SE 26-30s-3e, elev. 1,249 ft., dry, TD 3,466 ft., Kansas City 3,464 ft., Mississippian 3,055 ft., Arbuckle 3,446 ft.

Graham County: Jones-Shelburne & Farmer 1 Alexander, NW NW NW 29-7s-21w, elev. 2,128 ft., dry, TD 3,740 ft., anhydrite 1,727 ft., Heebner 3,229 ft., Lansing-Kansas City 3,356 ft., Arbuckle 3,718 ft.

Harvey County: Habiger 1 Simpson, SW SW SW 34-23s-2e, elev. 1,415 ft., dry, TD

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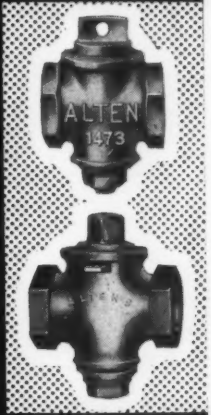

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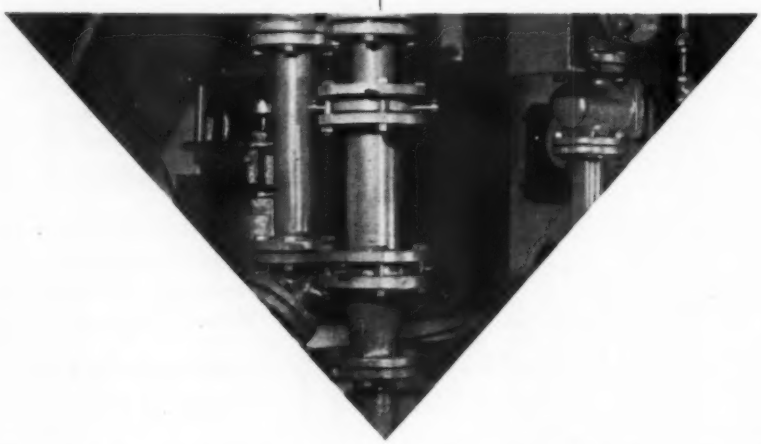

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Westgate-Greenland 1 Murty, SE NW SW 12-23s-3w, elev. 1,451 ft., dry, TD 3,928 ft., Lansing-Kansas City 2,872 ft., Mississippian 3,255 ft., Hunton 3,603 ft., Viola 3,702 ft., Simpson 3,831 ft., Arbuckle 3,910 ft.

Kingman County: Westgate-Greenland 1 Beck, NE NE NE 29-28s-5w, elev. 1,414 ft., dry, TD 3,906 ft., lime 2,985 ft., Lansing-Kansas City 3,017 ft., Mississippi lime 3,837 ft., dolomite 3,873 ft.

Huber-Prime 1 Hall, SE SE NE 25-27s-5w, elev. 1,448 ft., dry, TD 3,804 ft., lime 2,865 ft., Lansing-Kansas City 2,907 ft., Mississippi chert 3,729 ft., dolomite 3,794 ft.

Norton County: Rex & Morris 1 Weathers, NW SW SE 28-4s-22w, elev. 2,283 ft., dry, TD 3,807 ft., anhydrite 1,927 ft., Heebner 3,434 ft., Lansing-Kansas City 3,465 ft., cherty Sooy 3,738 ft., Arbuckle 3,750 ft., granite was 3,797 ft.

Phillips County: Sohio 1 Bishop, CSL SE SW 34-3s-19w, elev. 2,059 ft., dry, TD 3,616 ft., anhydrite 1,600 ft., Lansing-Kansas City 3,223 ft., Arbuckle 3,566 ft.

Reno County: Bradley Bros. et al 1 Soper, NE SE NW 30-25s-4w, elev. 1,527 ft., dry, TD 4,127 ft., Heebner 2,934 ft., Lansing-Kansas City 2,981 (?) ft., Sooy 3,556 (?) ft., Mississippian 3,561 ft., Kinderhook 3,821 ft., Viola 3,986 ft., Simpson shale 4,001 ft., Simpson sand 4,003 ft., Arbuckle 4,095 ft.

Rice County: Likins 1 Burge, SE SE SW 12-20s-7w, elev. 1,691 ft., dry, TD 3,810 ft., anhydrite 425 ft., Heebner 2,723 ft., lime 2,883 ft., Lansing-Kansas City 2,915 ft., Sooy 3,364 ft., Mississippi lime 3,388 ft., Kinderhook 3,439 ft., Misener 3,676 ft., Maquoketa 3,682 ft., Simpson 3,723 ft., Arbuckle 3,793 ft.

Hutchins 1 Hutchins, NW SW SE 22-20s-8w, elev. 1,648 ft., dry, TD 3,445 ft., lime 2,870 ft., Lansing-Kansas City 2,897 ft., Marmaton 3,72 ft., Sooy 3,306 ft., Kinderhook 3,311 ft., Misener 3,437 ft.

South Louisiana

Dual Producer Seen For Cox Bay Area

NEW ORLEANS.—Richardson & Bass perforated at 11,981-92 ft. and squeezed in the Cox Bay area wildcat, 4-18s-16e, Plaquemines Parish, and will test farther up the hole. The operators' 1-H State Lease 1,794, is bottomed at 13,429 ft. and has been the subject of much speculation in that area.

It is interesting to note that in connection with this prospective producer, the operators have requested a hearing before the conservation commission for dual completion of the well. The request asks for authority to complete the well through perforations at 9,104-14 ft. as an oil well, and through perforations at 8,980-84 ft. and 9,047-53 ft. as a gas well, which indicates the well will be completed a real commercial producer.

In Evangeline Parish, Texas Co. is preparing to test its 1 Valin Vidrine, wildcat 3 miles north of North Tepetate field, 24-6s-2w. Operator will perforate at 12,096-12,126 ft. for testing.

Justiss Mears Oil Co. has staked location and is building derrick to drill 1 Vincent Boagni, 14,000-ft. wildcat test approximately 1½ miles southwest of Opelousas field discovery in St. Landry Parish. Location is in 73-7s-4e.

Sohio Petroleum Co. has completed as a shut-in gas well its 1 Carter-Rutherford, SE SW 21-15s-6w, ¾ mile west-southwest of Hog Bayou. The well was completed through perforations at 6,692-6,700 ft. and shut in without taking production gage.

Shell Oil Co. will drill 4 Continental Land & Fur Co. 2½ miles east of Turtle Bayou field, Terrebonne Parish, indicating that it has found sand which is commer-

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cially productive in its 3 Continental Land & Fur Co. The new location is 26-17s-14e, being 1½ miles east-southeast of the 3 well, which is located in NE SE 28-17s-14e.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Cameron Parish: Sohio Petroleum Co. 1 Carter-Rutherford, 21-15s-6w, 2¾ mi. S, 1 mi. W Grand Chanier, TD 8,490 ft., perf. 6,692-6,700 ft., ungaged gas well.

Terrebonne Parish: Offshore "South Timbalier, Block 52"—Humble Oil & Refining Co. A-3 State Lease, 1,428, TD 13,015 ft., perf. 12,111-14 ft., 245 bbl. oil per day, ⅛-in. choke, TD 2,150 psi., gravity 32.5°.

SOUTH LOUISIANA WILDCAT FAILURES

Calcasieu Parish: Houston Oil Co. of Texas 1 Joe J. Fisher et al, 31-8s-13w, dry, TD 7,508 ft.

Lafourche Parish: Berkshire Oil Co. 1 Clotilda Plantation, Inc., 1¼ mi. N Lockport townsite, 12-16s-19e, dry, TD 11,794 ft.

Michigan

New Pay Venture May Boost Deep Work in Arenac Pools

MOUNT PLEASANT.—Arenac County oil producers were closely watching a well in Sterling Traverse and Dundee oil pool, Deep River Township, Arenac County, as preparations were being made to acidize a Richfield zone oil show in J. O. Mutch's 5 fee, NE SE SE 17-19n-4e. This deeper horizon test is presently bottomed out at 4,193 ft. with about 70 ft. of free oil showing natural in 40 hours from a pay logged at 4,154-60 ft. If this well proves to be commercial, it will mark the first Richfield producer in Deep River Township, and will open the prolific Deep River Dundee field for possible development in the lower zones (as well as the smaller Sterling pool), and will be the second Richfield oil producing area in the county.

The largest public auction of state lands for oil and gas lease rights closed at Lansing at 6:00 p.m., Friday, October 6. Over 190,000 acres were placed on auction during a two-day sale. Much of the acreage offered for leasing was located in northern Michigan, above areas now being developed for oil and gas development, and in a district where considerable core-drilling and other exploration will probably follow in the wake of this sale.

Although totals were not available at this writing, it appeared that the sale would be recorded as the largest in the state's history in all departments—number of acres offered, number of acres leased, and dollar bonuses paid. Many tracts in Otsego, Crawford, Roscommon and other northern counties commanded bonus bids of $10.00 per acre. All lands were classified as wildcat.

MICHIGAN SUCCESSFUL WILDCAT

Van Buren County, Pine Grove Township: Ford Henry 1 Cooley, NW NW NW 10-1s-13w, Traverse 1,396 ft. ft., 20 bbl. of oil per day, TD 1,399 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Leighton Township: Stanley L. Findley 1 Dewel, SE SW SE 19-4n-11w, Traverse 1,725 ft., dry, TD 1,761 ft.

Antrim County, Mancelona Township: Sun Oil Co. 1 Ward Land Co., SE SE SW 14-29n-5w, Traverse 1,759 ft., dry, TD 1,857 ft.

Gladwin County, Buckeye Township: Mogul Oil Co. 1 Johnson et al, N½ SE NE 15-18n-1w, dry, in Richfield, TD 4,943 ft.

Huron County, Brookfield Township: Alvin H. Weber 1 Good, NW NW NW 27-15n-10e, Dundee 2,649 ft., dry, TD 3,206 ft.

Isabella County, Broomfield Township:

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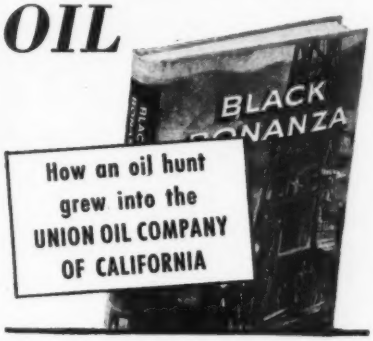

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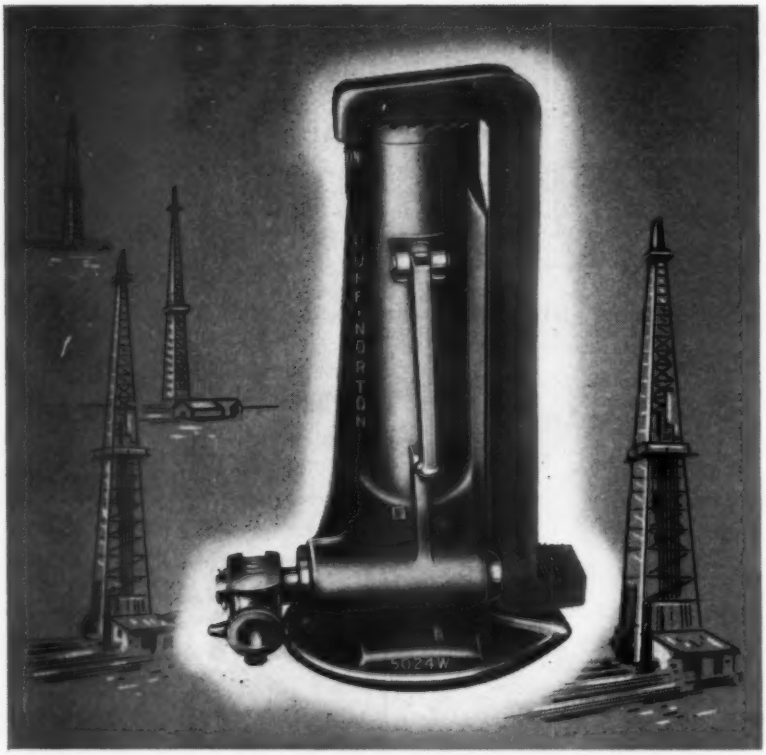

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Kent County, Algoma Township: W. Spencer Cook, Inc. 1 Henderson, NE SE NE 5-9n-11w, Traverse 2,248 ft., dry, TD 2,380 ft.

Manistee County, Springdale Township: Mercer Oil Co., Inc. 1 State-Springdale, NE SE NE 4-24n-14w, Monroe 2,040 ft., dry, TD 2,803 ft.

Montcalm County, Pine Township: Mercer 1 McCambridge, SE SE NE 7-11n-8w, Dundee 3,320 ft., dry, TD 3,470 ft.

Richland Township: Mercer Oil Co., Inc. 1 Robinson, NE SW NE 28-12n-5w, Stray 1,225 ft., dry, TD 1,261 ft.

Muskegon County, Moreland Township: Mercer Oil Co., Inc 1 Grabe & Gelderloss, NW NE SW 15-10n-14w, Monroe 2,443 ft., dry, TD 2,502 ft.

Osceola County, Leroy Township: Mercer Oil Co., Inc. and Smith Petroleum Co. 1 Calhoun, NW NW NE 20-19n-10w, Monroe 3,734 ft., dry, TD 3,784 ft.

Van Buren County, Geneva Township: Cook Drilling Co. and Arthur J. Gilmore 1 Hinz, NE NE SW 1-1s-16w, Traverse 1,155 ft., dry, TD 1,160 ft.

Eastern Texas

Important Test Stimulates Waskom Area Activity

DALLAS.—A connecting link between Waskom and Bethany fields was in the making this week at Bert Fields and Gulf Oil Corp. 1 C. C. Bearden unit, William Tiller Survey. At last report a production test had not been made as the well was flowing to clean, making oil, wash water and mud. Placed on 20/64-in. choke, flowing pressure was 550 psi. on tubing and 490 psi. on casing, with gas volume figured at 300,000 cu. ft. daily. Estimates on the probable oil production were around 100 bbl. daily. The well was to be completed from Travis Peak perforations at 6,078-90 ft.

The new producer is about 1 mile northwest of Fields and Gulf 1 Woolworth, a dual gas completion from the Hill zone and the Travis Peak. The Hill zone in the 1 Bearden was reported to have shown only a thin porous zone. The 1 Bearden unit is expected to bring about considerable drilling. Arkansas-Louisiana Gas Co. and Arkansas Fuel Co. jointly hold some 16,000 acres between the discovery and the Waskom area, according to reports, and were preparing to drill immediately.

Continental Oil Co. completed its 2 Royal National Bank, on the south side of Tennessee Colony field of Anderson County, as a new pay for the area. Completion was from the Pettit limestone at 9,626-45 ft. and without acid. On potential test, flowing through ¼-in. choke, the well made 400 bbl. of 53°-gravity oil daily, with gas-oil ratio of 1,747 cu. ft. Regular pay for the area is in the Rodessa.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) SUCCESSFUL WILDCAT

Kaufman County: Thomas D. Humphrey 1 N. E. Tharp, D. Cervantes Sur., A-78, 4 mi. SE Kemp, TD 3,648 ft., elev. 377 ft., Woodbine 3,448 ft., perf. 3,609-12 ft., pumped 99.4 bbl. 36.6°-gravity oil a day.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Red River County: Gross & Davis 1 Chas. T. Brooks, Benjamin J. Gooch Sur., 1 mi. E Bagwell, dry, TD 1,790 ft.

Rusk County: L. O. McMillan 2 Fred Hamilton, J. I. Sanchez Sur., 15 mi. SW Henderson, TD 4,320 ft.

Wood County: A. O. Phillips 1 H. S. Cathey, J. E. Allen Sur., A-17, 2 mi. SW Quitman, dry, TD 5,175, sub - Clarksville 4,321-29 ft., salt water.

Oklahoma

Lincoln County Wildcats Uncover Two New Pools

DELANEY DRILLING CO. 1 Little, NE NE SE 17-13n-5e, Lincoln County, prospective productive link between the East Sparks pool, a mile to the north, and the South Sparks pool, 1½ miles to the southwest, flowed 56 bbl. of oil in 24 hours through ½-in. choke on a production test for completion. Total depth is 3,557 ft. in Prue sand (productive zone of the East Sparks pool), topped at 3,535 ft.

Anderson-Prichard Oil Corp.'s Wilcox sand discovery well, 1 Bartodej, NW SW SE 32-12n-5e, 6½ miles southwest of Prague, and about 10 miles south of the Delaney well in the same county, swabbed and flowed 49 bbl. in 7 hours on a late production test. Second Wilcox sand, the pay zone, was logged at 5,028-53 ft. Hole is open from 5,030 ft. The well flowed initially from 9 to 10 bbl. of oil per hour.

Mizel Brothers 1 Crow, SE SE SE 29-17n-10e, which opens a new Dutcher sand pool 1 mile from other production in the Kellyville district, Creek County, flowed 208 bbl. of oil through casing during an 8-hour production test. Tubing is being run for completion. Hole is open from 2,400 ft. with Dutcher sand logged at 2,682-85 ft.

Another new Dutcher sand pool is indicated in Okfuskee County where K. A. Ellison recovered 1,080 ft. of oil in a drill-stem test of that zone in his 1 Foster, NE SW SE 6-13n-9e. Interval tested was at 3,260-70 ft. with top of the Dutcher zone at 3,253 ft. and the pay at 3,261 ft. Tester was open 1 hour. In the test, gas flowed within 7 minutes. Hole was deepened to 3,274 ft. and casing run to 3,256 ft. for completion. Location is just northeast of Welty and 2 miles northeast of the Southwest Welty pool, nearest production. The promising Rosenwald pool is 3 miles to the southwest.

Walter Gant and E. Dunlap, Jr., 1 Reid, SW SW SW 2-7s-2e, prospective pool opener northeast of Marietta, Love County, swabbed 52 bbl. of oil in 2 hours but the rate had dropped to less than 2 bbl. per hour at the end of that period. Operators propose to reperforate and apply a Hydrafrac treatment. Present perforations are 6,030-48 ft. and 6,054-60 ft. with casing on bottom of the hole at 6,246 ft. Prospective pay zone is the Deese sand.

The second pay zone for the recently opened Union Valley pool in Logan County has been proved by Robert M. Jordan at his 1 Gates, E½ SW NE 29-16n-1w. It is the Layton sand, in which casing was perforated at 4,075-97 ft., and from which the well flowed at the rate of 10,220,000 cu. ft. of gas and about 20 bbl. of distillate daily. The well is located northwest of the discovery, and until now only producer, 1 Carum, C W½ SW NW 33-16n-1w, completed in Simpson dolomite at 5,782-90 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Cleveland County: V. A. Brill et al 1 Riordan, SE SE NE 16-8n-1e, 1¾ mi. S of SE Denver, discovery in Roulette Creek, flowed 343 bbl. of 41.7°-gravity oil per day from sandy dolomite and second Wilcox at 6,417-29 ft., TD; Pawhuska 2,550 ft., Avant 3,530 ft., Belle City 3,965 ft., Hogshooter 4,460 ft., Checkerboard 4,830 ft., conglomerate 4,890 ft., Bartlesville 5,711 ft., Sylvan 6,030 ft., dense 6,200 ft., Viola 6,125 ft., dolomite 6,302 ft.

Pawnee County: R. L. Holtzman 1 Wolfe, SE SE SW 30-23n-5e, geological test ¼ mi. W old well, elev. 985 ft., pumped 75 bbl. of 40°-gravity oil per day from Oswego at 2,925-45 ft., TD 2,949 ft., Checkerboard 2,775 ft., Layton 2,510 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: S. D. Johnson et al 1 William Bee, NE SE SE 33-4s-1w, 1¼ mi. SW Lone Grove, dry, TD 3,244 ft.

Nelson & Spain 1 Pickens, NW NW NE 21-5s-1w, ½ mi. S of W. Brock, dry,

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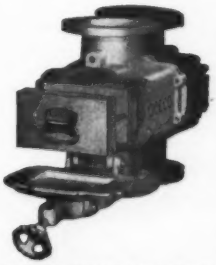

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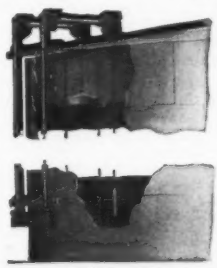

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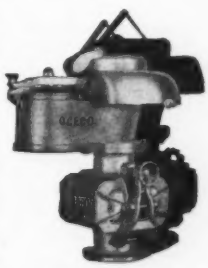

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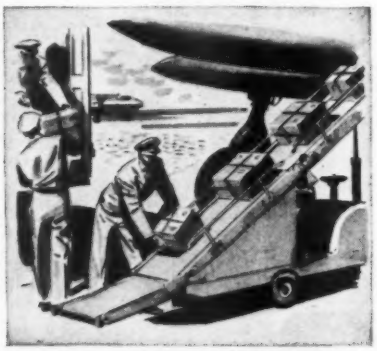

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Cotton County: R. P. Dorian 1 Williamson, NE SE SE 14-2s-11w, dry, TD 2,005 ft., sand 1,887 ft., and 1,976 ft.

Kay County: Ashland 1 Jueschke, NW SW SW 31-25n-2e, elev. 945 ft., dry, TD 4,489 ft., Layton 2,970 ft., Big lime 3,540 ft., Oswego 3,594 ft., Preu 3,750 ft., Mississippi chat 4,074 ft., Mississippi lime 4,088 ft., Woodford 4,398 ft., Wilcox 4,434 ft., second Wilcox 4,460 ft.

Kiowa County: F. L. Rookstool 1 Davis, SE NW NW 3-7n-17w, ⅞ mi. N of NE Hobart, elev. 1,602 ft., dry, TD 3,130 ft., Springer 2,030 ft., shaly water sand 2,060 ft., middle Chester 2,910 ft.

Lincoln County: Gillespie & Sons 1 Deacon, SW SW NW 29-17n-6e, 1¼ mi. E Happy Valley, elev. 862 ft., dry, TD 3,339 ft., Hogshooter 1,935 ft., Layton 1,995 ft., Prue 2,897 ft., Prue sand 2,916 ft.

Muskogee County: T. O. Wright, Jr. & Clee Wright 1 Gay, NW NW NW 13-11n-20e, 11 mi. SE Warner, dry, TD 3,279 ft., sand 750 ft., 1,430 ft., 1,737 ft., and 2,240 ft., lime 2,975 ft., broken granite 3,225 ft., sand 3,252 ft., quartz 3,271 ft.

Noble County: Hanlon-Boyle, Inc. 1 Juanite, SW SW NE 1-21n-1e, ½ mi. SW of NW Sumner, elev. 963 ft., dry, TD 4,775 ft., Perry 2,817 ft., upper Layton 3,175 ft., lower Layton 3,366 ft., Checkerboard 3,673 ft., Big lime-Oswego 3,792 ft., Verdigris 4,100 ft., Skinner sand 4,118 ft., Bartlesville 4,324 ft., Mississippi lime 4,375 ft., Woodford 4,525 ft., Viola 4,582 ft., Wilcox 4,662 ft., Marshall 4,684 ft., second Wilcox 4,703 ft.

L. H. Smith, Inc. 1 Watts, SE SW NE 33-22n-1w, dry, TD 5,244 ft., upper Layton 3,580 ft., Big lime 4,235 ft., Oswego 4,280 ft., Mississippi lime 4,790 ft., Woodford 5,017 ft., no Hunton, Viola 5,070 ft., sandy dolomite 5,106 ft., Wilcox 5,140 ft., second Wilcox 5,209 ft.

Okfuskee County: Manahan Oil 1 Replogle, NW NE SW 15-12n-8e, ⅞ mi. SW of S. Valley Grove, dry, TD 4,510 ft., Checkerboard 1,330 ft., Skinner 2,680 ft., Earlsboro 2,920 ft., Inola 3,180 ft., Bartlesville 3,195 ft., lime 3,380 ft., Booch 3,500 ft., Union Valley 3,734 ft., Woodford 4,233 ft., Hunton 4,263 ft., Sylvan 4,328 ft., Viola 4,413 ft., Wilcox 4,460 ft., second Wilcox 4,488 ft.

Payne County: R. L. Kemp and Thompson Drilling 1 Gant, SE SE NE 5-17n-6e, 2¼ mi. N Avery, elev. 786 ft., dry, TD 3,228 ft., Avant 1,525 ft., Hogshooter 1,828 ft., Layton 1,875 ft., Checkerboard 2,143 ft., Big lime 2,643 ft., Oswego 2,682 ft., no Prue, Verdigris 2,884 ft., Bartlesville 3,107 ft.

Stephens County: Keystone Oil 1 Lane, SE SE SW 15-2s-6w, dry, TD 3,433 ft.

Ohio Fields

Two Good Gas Wells Pace Week's Work

COLUMBUS.—Another good gas well was brought in along the west side of Baker pool in Hopewell Township, Perry County. Zane Oil & Gas Co. 3 L. J. Curry, Section 33, gaged 1,300,000 cu. ft., natural, from Clinton sand found at 2,964-98 ft.

A third Clinton sand gas well was completed in the new pool in Clay Township, Knox County. Ohio Fuel Co. 2 Glen Schooler, Lot 23, was drilled through the upper sand, logged at 2,841-59 ft., with a gage of 1,225,000 cu. ft., natural.

Walter Best has staked a location for a wildcat on E. J. Marting in Lot 4-SW, Boston Township, Summit County. John Galey has moved 1 mile north of his 1 Shipley for a test on the F. R. Fageol tract in Lot 37, Ravenna Township, Portage County.

The south part of New Castle Township,

Coshocton County, is getting a big play now, following the completion of several good wells. Fourteen wells are now drilling or have been located with drilling to be started immediately.

Canadian Fields

D2 Production Found In Central Alberta

CALGARY.—First apparent commercial yield of oil from the Devonian D2 zone in the Acheson-Stony Plain area of central Alberta was obtained this week at the California Standard - Imperial - Welbourne 16-3 well. Encouragement in the D2 was previously found at the Cal Standard-Imperial-Acheson 1 discovery, at Central Leduc Wild 1, and at Imperial-Stony Plain 1, but full potentialities were not determined at these wells which were all completed in the D3 Devonian reef.

The Welbourne well, located in LSD 16, 3-53-26w4, about ¼ mile west of the Acheson D3 discovery, ran three drill-stem tests in the D2. A 1-hour test, from 4,641-50 ft., gave a maximum natural gas flow rate of 50,000 cu. ft. daily, plus a pipe recovery of 2,220 ft. of 34.6°-gravity crude oil. A second test, from 4,650-55 ft., gave a gas flow rate of 73,000 cu. ft. daily plus a recovery of 2,00 ft. of oil, 490 ft. of muddy oil, and 10 ft. of salt water in 1 hour. A third test, from 4,655-60 ft., gave a 1-hour recovery of 2,000 ft. of oil, 490 ft. of muddy oil, and 495 ft. of sulfur water. Crew has drilled to 4,957 ft. and set string of casing prior to continuing to the D3.

Socony-Vacuum Exploration Co. is moving in drilling equipment for a third venture in the Camrose area of central Alberta where it recently made an important oil discovery in two zones of the Devonian. Meanwhile, the company's first follow-up well to the discovery has run two drill-stem tests, one in the Viking sand, and the other in top of Lower Cretaceous. The Viking test gave no oil or gas recovery, while the Cretaceous showed a slight flow of natural gas.

The company's third well, Socony-Ramsey 15-13, in LSD 13, 15-45-21w4, is located 2 miles east of the Socony-Flint 1 discovery well, and about a mile south-southeast of the first follow-up driller.

The second hole, Socony-Camrose 28-1, in LSD 1, 28-45-21w4, ran a 30-minute test of the Viking section at 3,433-53 ft., and recovered 1,035 ft. of salt water. The 1-hour Lower Cretaceous test, from 3,963-75 ft., gave a natural gas flow rate estimated at 40,000 cu. ft. daily, plus a pipe recovery of 180 ft. of slightly gas-cut mud and 630 ft. of salt water. Crew is now continuing to drill through the Cretaceous with current depth below 3,975 ft.

Imperial Oil, Ltd., obtained a substantial natural gas flow during a drill-stem test at its Roundhill wildcat on the central Alberta Plains. Source of the gas is believed to be from the Viking sand or top of Lower Cretaceous. The well, Imperial-Roundhill 1, in LSD 9, 2-49-19w4, is located about 19½ miles southeast of Joseph Lake Viking sand oil field and 11 miles south of Tofield natural gas production. A 1-hour test, from 3,417-29 ft., gave a recovery of 2,003 ft. of gasified salt water. A later 30-minute test, from 3,472-3,503 ft., gave a gas blow measured at 1,024,000 cu. ft. daily with a blow of salt water after 30 minutes, and a pipe recovery of 120 ft. of salt water. Operator is now coring at 3,626 ft.

UNSUCCESSFUL WILDCATS

Grimache 1, LSD 15, 4-55-25w4, TD 4,496 ft.
Sun Federal Prov. 1, LSD 1, 6-37-11w4, TD 3,870 ft.
Placid Assiniboine 1, LSD 2, 15-62-4w5, TD 6,004 ft.
Placid Nakamun 1, LSD 8, 23-56-2w5, TD 6,332 ft.
Scotford 1, LSD 33-54-21w4, TD 4,414 ft.
Cal Standard-Spotted Lake 3-15, LSD 3, 15-41-22w4.

Mississippi

North Adams County Gets New Artman Sand Pool

JACKSONVILLE.—New oil production is indicated 4 miles north of Pine Ridge field, Adams County, at Robert Oil Co.-Lyle Cashion 1 Davis heirs, 41-9n-2w, Jefferson County. Good shows of oil were reported in samples from the Artman sand, which was picked on electric log at 5,536-46 ft. It is reported that this section showed good resistivity kick on log. Hole is currently bottomed at 6,541 ft. and operators plant to drill ahead to approximately 7,100 ft. The Artman sand is the Wilcox producing zone in the field, where sand conditions have been rather erratic and hazardous in developing.

Oil production has been confirmed in Kingston field, Adams County, at Stanolind Oil & Gas Co. 1 G. W. Armstrong, 11-5n-2w, which is a west offset to the field discovery well and a new pay opener for the field. Completion was made through perforations at 6,488-90 ft. in the Wilcox. On potential test, the well flowed 54 bbl. of 36°-gravity oil per day through 6/64-in. choke. Tubing pressure was 480 psi. Discovery well for Kingston was Plains Production Co. 1 Walker, which was completed through perforations at 6,654-56½ ft.

Humble Oil & Refining Co. 1 W. A. Stockard et al, 33-1n-6e, wildcat in Amite County, is reported to have recovered 5½ ft. of shale from core at 11,660-70 ft. Op-

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erators have set 9⅝-in. protection casing at 8,939 ft. prior to cutting core. At last report operators were conditioning mud and drilling cement around 10,700 ft.

On the Hatchetigbee anticline, Clarke County, Alabama, California Co. has taken over operations of Danciger Oil & Refining Co.'s 1 John F. York, NE SE 1-7n-1w, and at last report was coring ahead below 12,850 ft. All information except the depth of cores is being withheld. Latest core was taken at 12,522-72 ft., which contained more salt than previous cores. Three salt beds of 6 ft., 13 ft., and 9½ ft. in thickness were described as clear to amber, crystalline salt with only thin streaks of shale. No porosity has been encountered in this lower evaporate section.

MISSISSIPPI SUCCESSFUL WILDCAT

Adams County: Stanolind Oil & Gas Co. 1 G. W. Armstrong, 11-5n-2w, perf. Wilcox 6,488-90 ft., TD 6,791 ft., 54 bbl. oil per day, 6/64-in. choke, gravity 36°, TP 460 psi.

MISSISSIPPI WILDCAT FAILURE

Copiah County: Southeastern Drilling Co. 1 Southern Package Corp., 6-10n-6e, dry, TD 10,326 ft.

Permian Basin

Permian Basin's East Side Reflects Steady Buildup

MIDLAND.—On the east side of the Permian Basin, Runnels County operators have brought in numerous wildcat discoveries this year, and development drilling has been carried on at a high rate, with little notice in the oil-country press.

Completion was made this week on another such discovery for the northern section of Runnels County. Robinson-Puckett, Inc., of Abilene, 1 T. B. Poe, southwest of the town of Winters, gaged 137.5 bbl. of 42,°-gravity oil in 8 hours, flowing through ¼-in. tubing choke from open hole at 3,497-3,510 ft. in the Canyon sand. Twenty-four-hour completion potential was 412.5 bbl. The new well is about 4½ miles south of North Winters multiple-pay field and Jim Adams Fry sand field.

In West Ballinger Canyon field, northwest of the town of Ballinger, development completion was reported for C. O. Davis, Dallas, 1 I. M. Turner. The Turner well offsets the new field's discovery to the north. Completion potential was 816 bbl. of 42°-gravity oil in 24 hours, flowing through ½-in. tubing choke, from open hole pay at 3,078-86 ft.

Coke County, bordering Runnels on the west, has gained new production this year and has had some exploratory drilling in the northeast section as a result of Runnels County activity.

In the new McCutchen (Cisco sand), field about 5 miles east of Robert Lee, Union Oil Co. completed its 3-B Daisy McCutchen as the third well for the pool. Daily potential was 357 bbl. of 44°-gravity oil, based on a 12-hour flow test. Production was through ⅜-in. choke, from perforations at 3,954-74 ft.

In southwestern Martin County, Gulf Oil Corp. 1-EB Glass was given up as a failure in the Ellenburger, in drilling to 12,915 ft., and tests were being made up the hole, in the Pennsylvanian. The well was being given heavy acid treatments, through perforations at 10,635-55 and 10,685-10,770 ft. In a 15-hour test, yield was 96 bbl. of oil and 30 bbl. of water, swabbing and flowing. Part of the oil was said to be load oil. In 4 hours of swabbing, yield was a 48-bbl. oil load, plus acid residue, at which time the well kicked off and flowed 14 bbl. of oil and 61 bbl. of acid residue in 8½ hours.

In central Martin County, Ashland Oil & Refining Co. 1 Tant Lindsay, Spraberry exploration projected to around 8,000 ft., had good shows of oil in a Permian limestone. A 1-hour drill-stem test from 4,274-4,300 ft. recovered 440 ft. of oil-cut mud and 930 ft. of slightly oil-cut water. Open flowing bottom-hole pressure ranged from 350-750 psi.

Humble Oil & Refining Co. 1 T. O. Midkiff, Midland County Spraberry sand discovery southeast of Midland was swabbed and flowed for 24 hours, yielding 198 bbl. of oil cut 6 per cent with salt water. Final test was in open hole from 7,281-7,435 ft., plugged-back total depth. At last report the rig was being moved off for completion.

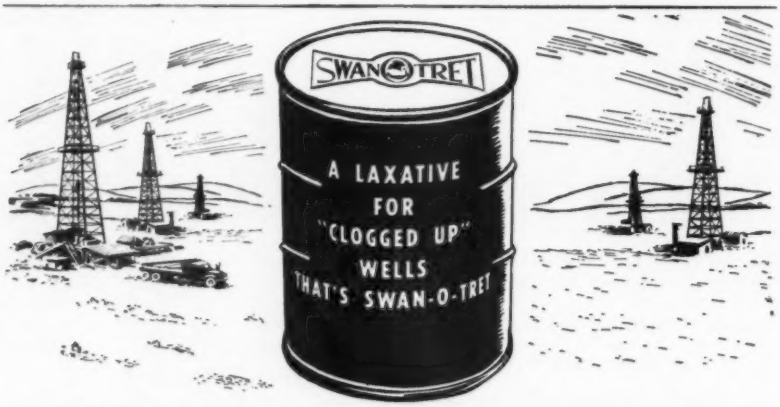
Magnolia Petroleum Co. and Sinclair Oil Co. 1 G. R. Davis, deep Upton County wildcat which only a few weeks ago was looked to as a possible long southwest extension to Pegasus Ellenburger field, or another discovery on separate structure, was reported to be making additional water. Following acid treatment through perforations from 13,100-13,200 ft., the well kicked off after swabbing and flowed 187 bbl. of oil and 680 bbl. of salt water in 24 hours. The test was made through various size chokes, and testing was to continue.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Runnels County: Mid-Continent Petroleum Corp. 1 Mary Sykes, Tract 19, Marshall University Sur. 511, 6 mi. SW Andrews 1 Willis, 3½ mi. NW Cree 1 Sykes, TD 3,716 ft., elev. 1,960 ft., Morris sand 3,704 ft., flowed 58 bbl. 40°-gravity oil a day, 13/64-in. choke, GOR 1,863 ft., TP 250 psi., CP 450 psi.

Terry County: Amerada Petroleum Corp. 2 Willard, 6-C37-PSL, TD 8,610 ft., elev. 3,238 ft., Wolfcamp 8,505 ft., PB 8,563 ft., flowed 912 bbl. 43°-gravity oil a day, ½-in. choke, GOR 456 cu. ft., TP 200 psi.

Tom Green County: Shell Oil Co. 1 W. J. Johnson, Sec. 21, WCRR Sur., elev.



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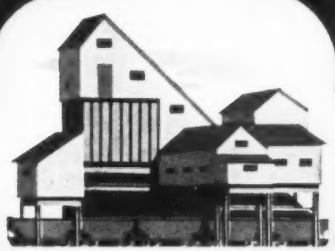

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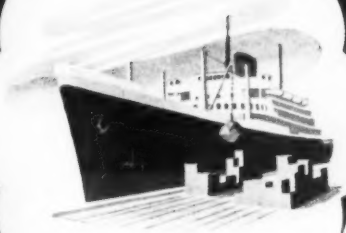

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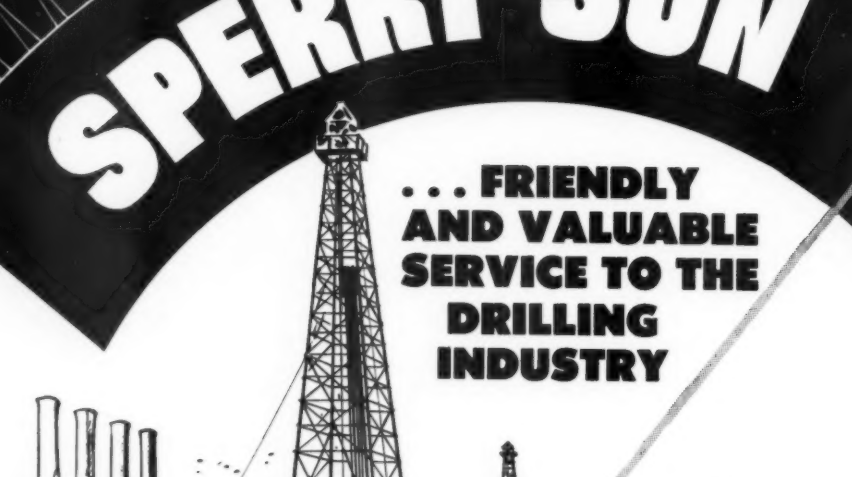

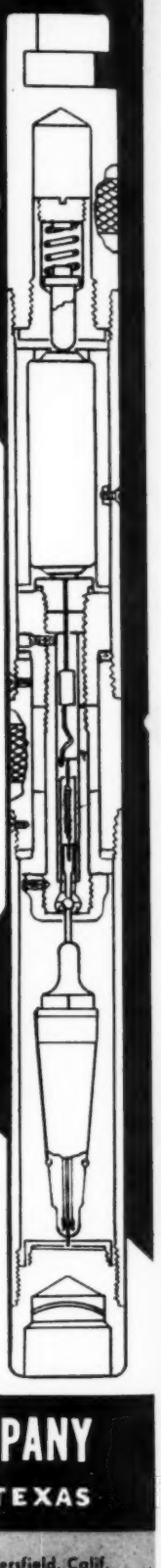

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WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Union Oil Co. of California 9 E. P. Cowden "A," 15-A55-PSL, S flank Dollarhide field, dry, TD 8,004 ft., elev. 3,109 ft., San Andres 4,150 ft., Glorietta 5,370 ft., Clear Fork 5,760 ft., Tubb sand 6,360 ft., Mississippian 7,900 ft.

Coke County: Humble Oil & Refining Co. 1 N. H. Pruitt, NE NE 427-1A-H&TC, 3 mi. NE Bronte field, dry, TD 5,670 ft., elev. 1,859 ft., Strawn 4,882 ft., Ellenburger 5,453 ft. by samples.

Kent County: Drilling & Exploration Co. 1-D Wilson Connell, SW SW 5-5-H&GN, 2 mi. NE Polar, dry, TD 8,010 ft., elev. 2,330 ft., San Andres 1,550 ft., reef 7,080 ft., Mississippian 7,130 ft., Ellenburger 7,850 ft.

King County: Ard Drilling Co. 6 R. B. Masterson, AB&M Sur. 55, 2¾ mi. S 2 Masterson, Canyon reef discovery, dry, TD 5,595 ft., elev. 1,756 ft.

McCulloch County: H. S. Westbrook 1 T. C. Ward, Sec. 1,363, 2 mi. N Melvin, dry, TD 1,158 ft., elev. 1,881 ft., Cisco 260 ft., sand 1,145 ft.

Reagan County: Pure Oil Co. 1 Cynthia Malone, Sec. 4, GC&SF Sur., A-9, 17 mi. E Benedum field, dry, TD 10,885 ft., elev. 2,607 ft., Spraberry 5,540 ft., Dean 7,110 ft., Strawn 9,710 ft., Mississippian 10,160 ft., Devonian 10,240 ft., Ellenburger 10,705 ft.

Runnels County: Warren Oil Corp. 1 Mollie Puckett, H. L. Bays Sur. 444, A-17, 2 mi. W Jim Adams field, dry, TD 5,473 ft., elev. 1,996 ft., Capps 4,422 ft., Fry 4,464 ft., Gardner 4,931 ft., Gray sand 4,962 ft., Odom 5,078 ft., Caddo 5,110 ft., Ellenburger 5,254 ft.

Sterling County: J. C. Ratliff, Jr. 1 W. J. Mann, 25-12-SPRR, 5 mi. SE Durham field, dry, TD 1,720 ft., elev. 2,246 ft., San Andres 1,184 ft., San Angelo 1,510 ft., Clear Fork 1,640 ft.

Terry County: Houston Oil Co. 1 H. C. Hinson, 2-T-D&W, 1 mi. W Mound Lake field, dry, TD 10,245 ft. in the Pennsylvanian, elev. 3,271 ft., San Andres 4,415 ft., Dean sand 9,015 ft., reef 9,980 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURE

Donley County: Tom C. Doswell 1 McMurtry, NE NE NE 40-C3-GC&SF, 9 mi. N Clarendon, dry, TD 5,375 ft., elev. 2,773 ft., dolomite 3,240-50 ft.

SOUTHEASTERN NEW MEXICO

HOBBS. — Stanolind Oil & Gas Co. 2 Leonard Oil Co., 12-26s-37e, 1 mile northeast of Dublin field, placed tentative top on the Fusselman section at 9,270 ft., on elevation of 3,025 ft. Results of a test at 9,255-9,315 ft. had not been determined at last report but when the tool was opened it produced an immediate strong blow of air and had gas at the surface in 6 minutes. During the 6-hour period it maintained a medium blow with strong hourly heads. The well has indicated production in both the Devonian and Ellenburger sections.

Gulf Oil Co. 1 Sams-State, deep wildcat in northwest Lea County, was fishing at total depth of 14,076 ft., still in dolomite. The well is to drill ahead to 14,300 ft. Oil shows were logged in the Wolfcamp at 10,420-441 ft.

Magnolia Petroleum Co. 1 C. L. O'Brien, 7-8s-30e, south offset to its Devonian discovery and lone producer in Lightcap field, was showing for a second pay for the area, in the transition zone between the Permian and Pennsylvanian formations. First test, in top of the section, from 7,143-58 ft. recovered gas and oil-cut mud. A 4-hour test at 7,158-68 ft. had oil at the surface in 2 hours and 23 minutes, and when cleaned into pits for 7 minutes, flowed about 7 bbl. of 48°-gravity oil in 1½ hours. The Lightcap discovery had no shows of oil or gas in the Permo-Pennsylvanian and was completed in Devonian pay at 7,960-76 ft.

Illinois-Ind.-Ky.

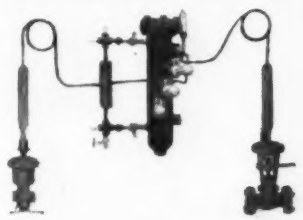
Knox County Discovery Makes Good Oil Flow

A PARTICULARLY promising discovery appears to have been made by Graham Development Co. at its 2 Meyers, NE NW NW of Militia Donation 38-2n-9w, about a mile northwest of Monroe City, Knox County, Indiana. Testing an interval at 1,502-05 ft. in saturated Aux Vases lime, the well kicked off, flowing initially at the rate of 35 bbl. of oil per hour. Flow rate increased, and in the first 14 hours, production totalled 600 bbl., averaging 42 and 43 bbl. per hour.

The location is about 1½ miles southeast of a wildcat oil producer (Monroe City North pool) completed last August by H. & V. Oil Co. in approximately the same pay zone, and about 2½ miles northwest of, and in line with production in the Monroe City pool. After producing 600 bbl. the well was shut in for additional tankage.

B. M. Heath 1 Ellis, NW NE NE 15-1s-8e, 4 miles northeast of Fairfield, Wayne County, Illinois, has established a new productive spot, ½ mile from production in the Mt. Erie sector of the Clay City-Noble Consolidated pool. It flowed 20 bbl. of oil the first hour, and in a 12-hour period it swabbed and flowed 200 bbl., an average of more than 16½ bbl. per hour. Production is from McClosky lime, in which casing was perforated at 3,176-86 ft.

The new Zion pool, located about 2 miles east of the town of the same name, in Sections 2 and 3-P-25, northern Henderson County, is becoming one of the most active areas in western Kentucky. Opened last June, and extended recently about a mile to the southeast, more than 15 wells have been completed to date. Spreading



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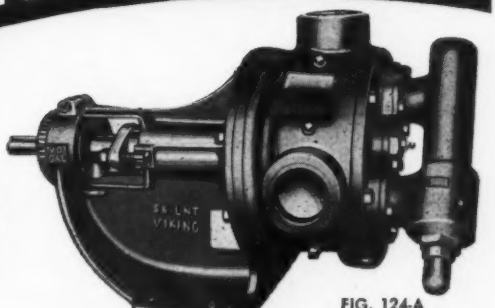

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development, both in the original pool and in the new southeast extension area, rapidly is connecting the two areas. Three wells were completed the past week. Four others are in process of completion. Five are drilling. Seven additional locations are being prepared for rigs. Production is from McClosky lime at depths of 2,150 to 2,200 ft. Wells produce initially from 100 to 700 bbl. per day.

ILLINOIS SUCCESSFUL WILDCAT

White County: George & Wrather 1 Douglas, SW SW NW 17-7s-8e, IP 19 bbl., Aux Vases 2,954-95 ft. and McClosky 3,050-58 ft., TD 3,128 ft. (new pool).

ILLINOIS WILDCAT FAILURES

Clark County: W. E. Camp 1 Hall, SW SW NE 1-11n-12w, dry, TD 2,369 ft.
W. W. Dayton 1 Selzer, SE NW SE 19-11n-10w, dry, TD 2,102 ft.
Clay County: J. A. Rudy 1 Patrick, NW SE NW 36-5n-5e, dry, TD 2,605 ft.
Fayette County: H. R. Lippitt 1 Whitefort, SE SW NE 33-7n-3e, dry, TD 2,357 ft.
Jefferson County: Calvert Drilling Co. 1 Bailey, SW SW SE 18-4s-4e, dry, TD 3,215 ft.
Madison County: O. R. Shull 1 Ernst, SE SW NE 31-6n-5w, dry, TD 800 ft.
Perry County: George & Wrather 1 Garrett, SE NW SW 9-4s-4w, dry, TD 2,703 ft.
Miami Operators 1 Duncan-Casner, NW NW SW 13-4s-2w, dry, TD 1,500 ft.
Saline County: Olsen & Jans 1 Wassen, SW SW NE 6-8s-7e, dry, TD 3,016 ft.
G. C. Schoonmaker 1 Carter, SW NW NE 32-7s-7e, dry, TD 3,116 ft.
Vermillion County: L. H. Ley) 1 Allison, C NW SE 8-21n-11w, dry, TD 850 ft.
L. H. Leyh 1 Turpin & Miller, NE NW SE 5-21n-11w, dry, TD 881 ft.
Wayne County: Arvin Drilling Co. 1 Bratton, SE SW SW 9-1n-6e, dry, TD 3,163 ft.
S. L. Deadman 1 Brock, SW SW SW 11-2s-6e, dry, TD 3,401 ft.
A. J. Slagter, Jr., 1 Overby, SE SE NE 33-2s-5e, dry, TD 3,319 ft.

INDIANA SUCCESSFUL WILDCAT

Knox County: R. L. Rea 1 Steckler, NE NE NW 1-1s-12w, IP 276 bbl., Pennsylvanian 1,427-33 ft. and 1,437-43 ft., TD 1,446 ft. (new pool).

INDIANA WILDCAT FAILURES

Dubois County: National Associated Petroleum Co. 1 Alvey, NW SE NE 34-2s-5w, dry, TD 950 ft.
Knox County: R. Hennig 1 Sparks, NW SE NW 22-5n-7w, dry, TD 913 ft.
Gibson County: Ashland Oil & Refining Co. et al 1 Jones, SE NW NE 30-3s-11w, dry, TD 2,616 ft.
Miami County: Morrison & Hull 1 Robinson, NW SW SE 21-27n-5e, dry, TD 895 ft.
Posey County: George & Wrather 1 Aldridge, SE SE SE 8-6s-14w, dry, TD 2,961 ft.
Slagter Production Co. 1 Phister, NE NE SW 6-5s-12w, dry, TD 2,657 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Henderson County: C. R. Craft 1 Beasley, NW cor. NW SW SW 8-Q-26, IP 17 bbl. Benoist 1,874-1,901 ft., TD 1,905 ft.

WESTERN KENTUCKY WILDCAT FAILURE

Daviess County: Producers Pipe Line Co. 1 Rightmeyer-Holder, SW NE NW 12-O-28, dry, TD 2,034 ft.

EASTERN KENTUCKY

ASHLAND.—In Wolfe County and adjoining the Powell County line along Whites Branch, Albert Dodge et al have recently made two more completions in the rapidly growing East Pilot field. The operators' 21 J. B. White heirs was good for 15 bbl. of oil daily from Corniferous lime at 887-993 ft., total depth. Their 21 J. B. White heirs also completed for 15 bbl. daily from 867-976 ft., total depth.

In Himyar gas field of Knox County and located on Stinking Creek, Petroleum Exploration Co. has completed 1 Parker Bingham for 1,850,000 cu. ft. of gas daily from

Corniferous lime at 2,334-2,384 ft. Total depth is 2,401 ft. The well was shot with 60 qt. of solidified nitroglycerin.

In Isonville pool, Elliott County, C. C. Haines has completed 3 D. M. Oliver for 5 bbl. of oil daily from Weir sand at 1,173-97 ft. with the bast pay from the first 6 ft. in the zone. Total depth is 1,199 ft. The well was shot with 120 qt. of nitroglycerin.

Rocky Mountain

Newcastle Sand Produces At Weston County Test

DENVER.—An important extension venture in the Clareton area, Weston County, Wyoming, is reported flowing 300 bbl. of oil per day through 32/64-in. choke from Newcastle sand. A. L. Schlaikjer et al 1 Darlington, SW NE NW 21-43n-65w, logged the Newcastle at 6,204 ft. and reached pay at 6,225 ft. Twenty-four feet of pay was found with the top section fairly tight. No open flow gage has been made at the well. This test is located west of Mush Creek and southwest of Fiddler Creek, and considered important because of indication of better sand development toward the basin area than found in other wells in this area.

General Petroleum Corp. has completed tank installation and is now preparing for a 72-hour production test at its discovery well, the 84-32-G in SE SE NE 32-47n-92w, Embar strike at Slick Creek, Washakie County. This is apparently one of the best wells to be drilled to Embar on the east side of the Big Horn basin; it flowed at the rate of 50 bbl. of oil per hour for 2½ hours on initial tests last week.

Montana.—Farmers Union Central Exchange reached the Amsden sand at 4,811 ft. with shows of oil at the 1 Sawyer. The well is located in C NE SW 26-11n-32e, between Ragged Point and Sumatra fields. Seven miles southeast of this well, Texas Co. topped the Amsden at 4,303 ft. and is testing with total depth at 4,473 ft. On drill-stem test at 4,419-34 ft., open 2 hours, recovery was 90 ft. of oil-cut mud with 10 per cent oil.

Western Nebraska.—A Sunol area wildcat is being completed as a gas discovery. Ohio Oil Co. failed to find production in lower zones in the test, and has run casing for completion as a gas well in the "D" sand. The well, 1 Fender, NW NW SW 2-14n-48w, is the first well in the current series of wildcats to go below the Morrison. It was drilled to 6,814 ft., and has been plugged back to 4,400 ft. with casing cemented at that depth. After perforating with 30 holes at 4,350-60 ft., operator recovered gas at the rate of 1,700,000 cu. ft. per day on drill-stem test.

Colorado.—Stanolind Oil & Gas Co. is running electric log with total depth at 7,919 ft., at its 1 Ute Indian, C SE NE 18-33n-7w, Ignacio area wildcat, LaPlata County. On drill-stem test at 7,815-7,919 ft., open 1½ hours, there was a light blow for 25 minutes and recovery was 240 ft. of fresh water with 90 ft. of mud. The well is believed to be through the Morrison, which showed an estimated 10,000,000 cu. ft. of gas per day. Gas was also found in the Fruitland and Pictured Cliffs zones. The Dakota, primary objective of the test, was hard, tight, and quartzitic, with only a small amount of gas. However, operator may set casing on top of Dakota and produce from both formations. This will be the second Morrison discovery in the San Juan basin.

Idaho.—Sun Oil Co. is plugging its wildcat failure in the Big Elk area, Bonneville County. The company's 1 Unit, CN½ NW SE 23-2s-44e, went through the Tensleep zone and is bottomed at 5,597 ft. Formation tops have not yet been released, but no shows were reported in the well.

North Dakota.—Although results to date have not shown commercial production in the 12,000,000-acre play through the Williston basin, wildcat operations are still continuing through the area. Magnolia Petroleum Co. has announced location for 1 State, C SE NE 36-141n-73w, stratigraphic test on the east side of the basin in Kidder County. The well is expected to go to granite, at depth less than 6,000 ft. There have been four wildcat failures this year, with the wells scattered throughout the basin. Amerada Petroleum Corp. is drilling below 6,000 ft. at 1 Iverson, C SW SW 6-155n-95w, in the Beaver Lodge area, Williams County, in the northwestern part of the state. This well is expected to go below 12,000 ft. for a thorough test of the section in this area. Rumors in Bismarck credit Phillips Petroleum Co. and Carter Oil Co. with plans for a wildcat in Morton County. Phillips has been doing seismic and surface work on Carter acreage through this area on a joint deal for processing and drilling Carter acreage. Other wildcats are in the planning stage for the region, with no definite announcement of locations.

WYOMING WILDCAT SUCCESS

Byron, Big Horn County: M. D. Smith 1 Brown, NW NE SE 31-56n-96w, TD 2,757 ft., flowed 250 bbl. 58°-gravity oil per day, 1-in. choke, 5½-in. casing 2,714 ft., Frontier 2,714 ft.

WYOMING WILDCAT FAILURES

Manderson, Big Horn County: Pioneer Oil Corp. 1 Mabel S. West, C SE NW 20-50n-92w, TD 5,741 ft., dry, Cody 1,290, first Frontier sand 4,242 ft., Mowry 4,748 ft., Cloverly 5,503 ft., Morrison 5,623 ft.

Box Elder Junction, Converse County: Ajax Oil Co. 1 Carrie J. Scott, NE SW SE 12-33n-75w, TD 8,283 ft., dry, Teapot 2,600 ft., Parkman 3,040 ft., Steele 3,595 ft., Shannon 4,870-5,150 ft., Niobrara 6,225 ft., Carlisle 6,650 ft., first Wall Creek 6,960 ft., second Wall Creek 7,050 ft., Muddy 7,996 ft., Dakota silt 8,198 ft.,

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Dakota sand 8,189-8,208 ft., Lakota sand 8,245 ft.

South Big Muddy: Western Oil Fields, Inc., 1 State "A," C SE NW 22-33n-76w, TD 5,157 ft., dry, Steele 820 ft., Stray sand 1,149 ft., Shannon 1,695 ft., Niobrara 3,155 ft., Frontier 3,853 ft., second Frontier 3,992 ft., Muddy 4,965 ft., Dakota 5,092 ft.

East Meadow Creek, Johnson County: Peak Drilling Co. 1 Knighton, NW SW NW 32-42n-77w, TD 5,734 ft., dry, Teapot 4,150 ft., Parkman 4,492 ft., Steele 4,925 ft., Sussex 5,603 ft.

West Sussex: Mel Collier 1 Government, NW NE SE 4-42n-80w, TD 4,726 ft., dry, Sussex absent, Shannon 1,045 ft., first Wall Creek 3,235 ft., second Wall Creek 3,405 ft., third Wall Creek 3,575 ft., Dakota 4,568 ft., Lakota 4,661 ft.

Lightning Creek, Niobrara County: Ben F. Brack Oil Co. 1-"A" Kitchen Land & Cattle Co., SW NW SE 12-37n-66w, TD 8,190 ft., dry, Fox Hills 2,615 ft., Pierre 2,930 ft., Shannon sand 4,175-4,206 ft., Niobrara 6,095 ft., Wall Creek 6,939 ft., Greenhorn 7,220 ft., Muddy 7,876 ft., Dakota 8,068 ft.

COLORADO WILDCAT FAILURES

Paradox Flank, Montrose County: Chicago Corp. et al., 1 Ayers, NW NW SW 31-47n-18w (NMPM), TD 6,860 ft., dry, Cutler 530 (?) ft., Rico Hermosa 4,160 ft.

Lee Pool, Morgan County: Ed Fisher and Olds Oil Co. 1 Lee-Davidson, SE NW SE 35-3n-57w, TD 5,610 ft., dry, Hygiene 2,370 ft., Niobrara 4,710 ft., Timpas 4,978 ft., base Timpas 5,033 ft., Muddy 5,441 ft.

WEST NEBRASKA WILDCAT FAILURE

East Gurley, Cheyenne County: Ohio Oil Co. 1 Jurgens, NE NE SW 33-16n-48w, TD 4,930 ft., dry, Pierre 990 ft., Niobrara 3,537 ft., Ft. Hayes 3,791 ft., Codell 3,894 ft., Greenhorn 4,073 ft., first Dakota 4,310 ft., second Dakota 4,376 ft., third Dakota 4,496 ft., first Lakota 4,670 ft., second Lakota 4,735 ft., base third Lakota 4,788 ft., fourth Lakota 4,844 ft., Morrison 4,910 ft.

NORTH DAKOTA WILDCAT FAILURES

Emmons County: Roeser & Pendleton 1 Weber, C NE NE SE 35-133n-76w, elev. 2,012 ft. KB, tight hole, granite 5,555 ft., dry, TD 5,556 ft.

McLean County: Samedan Oil Co. 1 Hanson, C NE 10-146n-81w, elev. 1,995 ft. KB, dry, TD 9,033 ft.

Southwest Texas

Salt Dome Discovery Flows Oil on Test

CORPUS CHRISTI.—H. R. Smith and American Republics Corp. 1 J. C. Dilworth, Jr., wildcat in the Rafael Vasquez Survey 42, McMullen County, flowed approximately 100 bbl. oil per day through 10/64-in. choke on production test. Perforations were made at 4,929-34 ft. This well is also the discovery of a new salt dome in the northern part of the county. It was drilled to a depth of 8,088 ft. in a salt mass topped at 7,650 ft., then plugged back and set 5½-in. production string at 5,002 ft. When the salt was encountered, operators drilled into the mass, not knowing whether it was a dome or a stray salt ledge. This is approximately 50 miles north of previously known salt domes in the southwest salt dome basin, and discovery of a dome here is a surprise to operators in this region.

In East Riverside field of Nueces County, Newman Brothers Drilling Co. and Alaska Steamship Co. have run potential gage on their new oil pay discovery, 3 J. A. Thompson. Through perforations at 5,030-45 ft. the well flowed 156 bbl. of 32°-gravity oil per day through 9/64-in. choke. Pressure on the tubing was 650 psi. with the casing sealed. Total depth of the well is 6,608 ft., with 5½-in. pipe set to 6,606 ft.

Humble Oil & Refining Co. has completed 1 Robert J. Kleberg, Jr., Trustee, Quiteria Pasture, for a gas discovery well and shut it in without taking gage. Completion was made through perforations at 8,282-87 ft., after drilling to a total depth of 9,250 ft. It is located in the Santa Quiteria Grant.

Ben D. Marks, Trustee, 1 Downs Royalty Corp., in the extreme northwest corner of Starr County, cored oil sand from 2,123-30 ft. and made a 25-minute drill-stem test at 2,124½-30 ft., using ⅜-in. bottom and ¼-in. top chokes. Recovery was 240 ft. of pipe line oil, 40 ft. of oil-cut mud and no water. Maximum surface pressure was 7½ psi. and bottom-hole flowing pressure was 95 psi. Operator has set casing to 2,124½ ft. and at last report was waiting on cement. The prospective discovery is located in Block 42, J. A. Harvey Subdivision, El Javali Grant.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Brooks County: Humble Oil & Refining Co. 1 Robert J. Kleberg, Jr., Tr., Quiteria Pasture, Santa Quiteria Grant, TD 9,250 ft., perf. 8,282-87 ft., ungaged gas well.

Nueces County: Newman Bros. Drilling Co. and Alaska Steamship Co. 3 J. A. Thompson, Nueces County Winter Vegetable Gardens, 4 mi. W Calallen, TD 6,608 ft., perf. 5,030-45 ft., 146 bbl. of oil per day, 9/64-in. choke, gravity 32°.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Duval County: Casco Oil & Gas Co. 1 Vivanco heirs, Sur. 456, J. J. Vivanco Sur., A-1,797, dry, TD 2,510 ft.

V. G. Schimmel et al B-1 J. T. Dinn, SK&K Sur. 440, 1½ mi. SE Pantex field, dry, TD 3,636 ft.

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Foreign: D. T. O'Connor, 500 Fifth Avenue, New York, N. Y.; Petroleum Industry Consultants, C.A., Caracas, Venez.; Denton-Spencer Co., Ltd., Calgary, Alberta, Canada

San Patricio County: Luling Oil & Gas Co. 2 D. Whetstone, Blocks 109 and 116, Welder & Odem Subd., 1 mi. E Odem field, dry, TD 5,444 ft.

Starr County: Continental Oil Co. 4 Lloyd Bentsen, Los Megueyes Grant, 7 mi. NW McCook, dry, TD 7,546 ft.

Wilson County: M. W. Messer 1 Alton Heirholzer, Tract 5, Rafael Salinas Sur. 343, 12 mi. SW Floresville, dry, TD 1,045 ft.

Zapata County: H. R. Smith 1 J. M. Sanchez, W. F. Lacy Subd., Share 9, San Ynacio Subd. of Jose Vasques Borrego Grant, dry, TD 4,520 ft.

California

Oregon Test Well Will Drill Deeper

LOS ANGELES.—Because of water influx into the hole, Oregon's potential oil discovery failed to establish commercial production on recent tests. The operator, Tri-State Gas & Petroleum, Ltd., has moved off the cable tools used to drill the 1,212-ft. hole and has moved in a rotary rig capable of drilling to 3,000 ft. If the deeper drilling proves unsuccessful, hole will be plugged back and additional attempts made to complete the well at its present depth.

The wildcat, Tri-State 1 Fisher, is about 9½ miles southwest of Lakeview or just above the California line. Located in Lake County, its site is in southwest Section 22-40s-19e, at an elevation of 4,750 ft. An 8⅝-in. casing string was set at 1,200 ft. before test was made of the fractured oil zone. Gravity of the oil produced on tests was about 37°. The substantial volume of gas accompanying the crude reportedly had a heat value of about 1,600 B.t.u.

Tri-State, made up of a group of Eugene, Ore., business men, holds a block of about 44,000 acres around the wildcat. The only production found in the area to date has been small amounts of marsh gas from shallow pays. Geologists generally regard the area as unfavorable for oil accumulations.

California operations.—In California developments centered largely around the staking of new wildcats. In Santa Cruz County, Texas Co. will drill its 1 Pierce about 8 miles northwest of Watsonville, in southeast Section 15-11s-1e. About 1½ miles west of gas production in Rio Vista field of Solano County, Natural Gas Corp. of California has staked location for the 1 N. C. Anderson heirs. This wildcat, in Section 28-4n, will be a 6,000-ft. Hamilton sand test.

Also in the northern area and in Colusa County, L. O. Tarrant will drill the 1 Neita Peterson in Section 6-17n-4w. Situated in the Sites anticline area, the wildcat is located about 1 mile southwest from a 4,343-ft. dry hole drilled by Universal Consolidated Oil Co. last year. It will be about 3 miles north of an earlier wildcat drilled by Consolidated, which was dry at 4,923 ft.

The closely watched wildcat in the San Fernando area of Los Angeles County, Section 1-2n-16w, failed on first efforts to complete it as a pumping discovery. The test, Los Nietos Co. 1 Edwards, produced wash oil but very little formation oil from the plugged back depth of 3,980 ft. At the week end the operator was continuing to make pumping tests periodically.

The Carrizo Plains area north of Cuyama Valley, where all wildcatting efforts to date have ended as failures, has received another test. Known as the Warren L. Meeker and associates 1 H. C. Smith, it will be drilled in Section 15-11n-26w, or about 9½ miles northeast of Cuyama oil production. Equipment has been moved in for the test.

Other field developments included the staking of a ¾-mile stepout from the recent Drummond-Union oil discovery near Hanford in Kings County. About 4 miles east of Placerita Canyon production in Los Angeles County, Sandee Oil Co. has staked its 1 Brooks in Section 2-3n-15w.

CALIFORNIA UNSUCCESSFUL WILDCATS

Kern County, Belgian Anticline area: Pacific Western Oil Corp. Stone-TWA, 31-30s-22e, dry, TD 5,850 ft., elev. 1,579 ft.

Devils Den area: G. Graham 1 Core Hole 23-25s-18e, dry, TD 1,488 ft., elev. 600 ft.

Tunis Creek-South area: Badger Oil Co. 1 Badger, 4-10n-18w, dry, Santa Margarita 220 ft., basal detritus 854 ft., dry TD 1,687 ft., elev. 1,113 ft.

Kings County, Trico-NW area: Trico Oil & Gas Co. 1 Lewis Comm., 2-24s-22e, dry, TD 2,650 ft., elev. 205 ft.

Los Angeles County, Lancaster area: Morris B. Marks 1 Gloria, 2-8n-12w, dry, TD 1,256 ft., elev. 2,304 ft.

Puente area: Puente Development Co. 1 Wilson-Carrillo, 24-2s-10w, dry, TD 4,049 ft. elev. unknown.

Globe Appoints Mitts to Rocky Mountain Area

C. E. Whittaker, president of Globe Oil Tools Co., Los Nietos, Calif., recently announced the appointment of W. G. (Bill) Mitts as Globe representative in the Rocky Mountain area. Mitts worked for many years with Superior Oil Co., and more recently held the position of transportation manager with Fred M. Manning, Inc., in Casper, Wyo.

Mitts operates a warehouse at Casper, where he maintains a complete stock of Globe junk catchers and Globe two-cutter and four-cutter rock bits.

Gulf Spreads Air Selling

Since Gulf Oil Corp. entered aviation marketing in 1934, its pilot salesmen have flown more than 3,400,000 miles and have spent more than 25,000 hours in the air. Currently, four new Cessna 190's are replacing older planes and will bring the Gulf fleet to seven postwar models.

Elliott Named to Davey, Paxman Board of Directors

Davey, Paxman & Co., Ltd., Colchester, England, has announced that J. P. Elliott, F.C.I.S., F.A.C.C.A., A.C.W.A., secretary and chief accountant of the company, has been appointed to its board of directors.

BAIRD - - - TOOLS

for—

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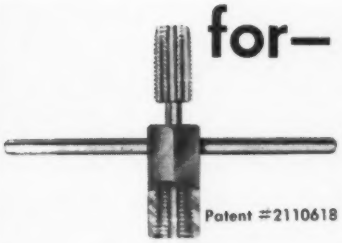
★ RODS
★ SLUSH PUMPS
★ BLOWOUT PREVENTER STUDS



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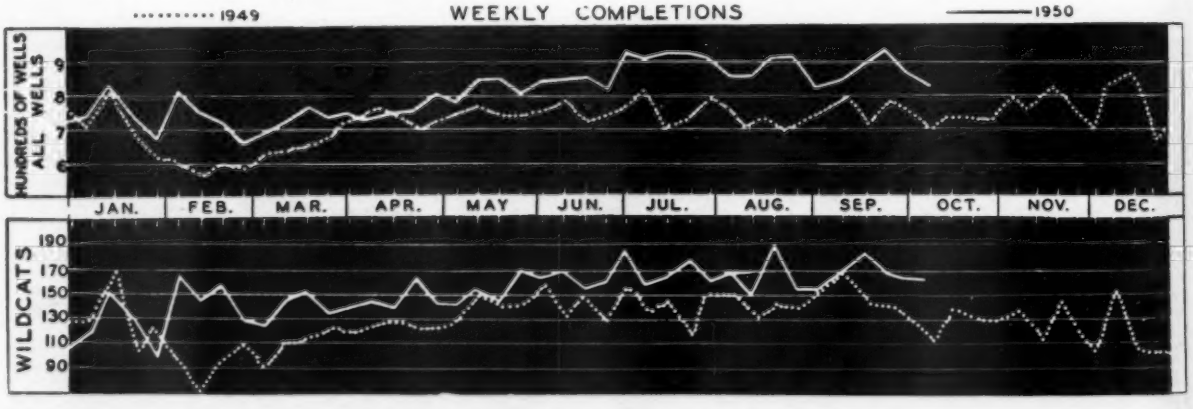
CURRENT STATISTICS

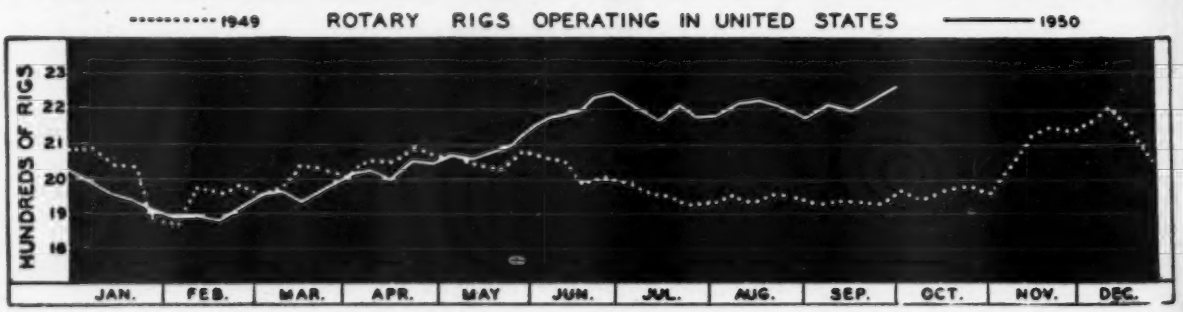
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED OCTOBER 7, 1950

	Total of all wells					Oct. 7		Wildcat completions and discoveries									
													Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	19,976	528	790	0	0	0	0	0	0	0	0	0	0
Pennsylvania	30	14	3	†13	45,968	1,030	1,263	0	0	0	0	0	0	0	1	2	3
West Virginia	15	3	¶5	7	¶45,025	511	383	0	0	¶1	1	2	0	0	¶19	17	36
Ohio	12	3	5	4	27,054	771	841	0	0	0	0	0	2	0	2	10	14
Indiana	32	10	3	19	52,421	1,271	1,032	1	0	0	6	7	43	0	1	204	248
Kentucky	32	17	2	13	61,621	892	725	1	0	0	1	2	23	0	1	75	99
Illinois	67	25	1	‡41	153,559	2,122	1,966	1	0	0	15	16	43	0	2	465	510
Michigan	19	4	1	14	48,209	674	781	1	0	0	12	13	25	0	4	234	263
Kansas	76	39	9	§28	246,713	2,925	2,498	4	0	0	11	15	83	0	11	483	577
Nebraska	2	1	0	1	9,613	97	21	0	0	0	1	1	6	0	1	45	52
Oklahoma	107	77	3	27	417,400	4,153	3,294	2	0	0	12	14	126	6	15	508	655
Texas	308	190	14	104	1,325,746	12,543	10,346	11	2	3	50	66	388	36	89	1,990	2,503
North Central (Dist. 7-B & 9)	98	47	1	50	273,273	3,793	3,439	5	0	1	24	30	171	2	24	786	983
West (Dist. 7-C & 8)	90	75	0	15	485,629	3,778	2,490	3	0	0	9	12	76	2	4	384	466
Panhandle (Dist. 10)	26	13	9	4	81,880	715	746	0	0	0	1	1	1	0	2	15	18
Eastern (Dist. 5, 6, & 6-P)	21	15	0	6	85,009	884	656	1	0	0	3	4	14	5	3	149	171
Gulf Coast (Dist. 2 & 3)	39	21	2	§16	237,015	1,757	1,520	1	2	1	7	11	65	16	32	290	403
Southwest (Dist. 1 & 4)	34	19	2	13	162,940	1,616	1,495	1	0	1	6	8	61	11	24	366	462
Louisiana	41	22	5	14	297,690	1,875	1,813	2	0	1	3	6	39	15	6	161	221
Northern	17	6	4	7	69,631	1,002	1,081	1	0	0	1	2	8	3	2	72	85
Southern	24	16	1	7	228,059	873	732	1	0	1	2	4	31	12	4	89	136
Arkansas	3	0	0	3	13,246	312	254	0	0	0	2	2	10	0	0	73	83
Mississippi	4	3	0	1	28,707	243	265	1	0	0	1	2	9	2	0	87	98
Southeastern States	0	0	0	0	0	46	40	0	0	0	0	0	1	0	1	26	28
Montana	0	0	0	0	0	187	197	0	0	0	0	0	1	0	0	31	32
Wyoming	17	8	2	7	74,159	444	451	1	0	0	6	7	19	0	0	60	79
Colorado-Utah	3	1	0	2	9,529	71	113	0	0	0	2	2	4	0	2	47	53
New Mexico	9	5	0	4	58,482	475	399	0	0	0	0	0	10	1	2	41	54
California	31	20	3	8	127,432	1,365	2,003	0	0	0	6	6	20	0	3	291	314
Miscellaneous	2	0	0	2	14,589	42	16	0	0	0	2	2	0	0	0	17	17
Total United States	824	449	56	319	3,077,139	32,577	29,491	25	2	5	131	163	852	60	160	4,867	5,939
Total previous week	872	491	53	328	3,180,969	....	....	20	2	4	138	164	827	58	155	4,736	5,776
Total October 7, 1949	716	415	74	227	2,377,035	....	....	18	3	4	89	114	731	70	156	4,279	5,236

Service wells included: *7, †13, ‡2, §1. ¶Incl. 1 Md. at 2,869 ft.





DAILY AVERAGE PRODUCTION FOR WEEK

	Oct. 7 crude oil	B. of M. Oct. demand	Sept. 30 crude oil
Alabama	2,200	1,600	2,150
Arkansas	81,500	90,000	81,400
California	927,600	930,000	923,400
Colorado	63,000	67,000	66,550
Eastern	65,500	65,000	65,500
Florida	1,625	1,400	1,475
Illinois	180,900	188,000	173,900
Indiana	30,900	31,000	30,100
Kansas	312,300	308,000	313,850
Kentucky	28,700	30,000	28,100
Louisiana	580,500	600,000	577,800
North Louisiana	115,500	.....	115,250
South Louisiana	465,000	.....	462,550
Michigan	43,700	47,000	46,700
Mississippi	108,700	120,000	108,600
Montana	22,900	24,000	22,950
Nebraska	3,400	5,000	3,350
New Mexico	131,875	154,000	136,675
Oklahoma	476,850	470,000	469,500
Texas	2,570,725	2,330,000	2,620,800
Dist. 1 (Southwest)	31,000	.....	30,800
Dist. 2 (Southwest)	150,050	.....	150,950
Dist. 4 (Southwest)	233,250	.....	235,250
Dist. 3 (Gulf Coast)	450,875	.....	454,625
Dist. 5 (Eastern)	42,950	.....	44,075
Dist. 6 (Eastern)	102,225	.....	104,250
East Texas field	296,000	.....	305,400
Dist. 7-C (West)	70,800	.....	66,450
Dist. 8 (West)	870,550	.....	905,950
Dist. 7-B (W. Central)	78,700	.....	75,150
Dist. 9 (N. Central)	154,325	.....	156,500
Dist. 10 (Panhandle)	90,000	.....	91,400
Utah	3,800	4,000	3,800
Wyoming	164,300	174,000	164,000
Total United States	*5,800,775	5,640,000	5,840,600
Change from prev. week, down	39,825		
Canada	84,730	.....	86,985

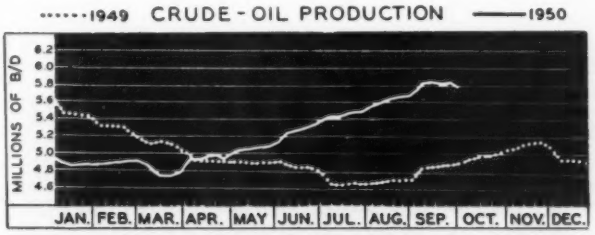
Total U. S. production January 1-October 7 .... †1,483,522,215 bbl.
Same period last year (crude plus cond.) ..... 1,417,644,730 bbl.

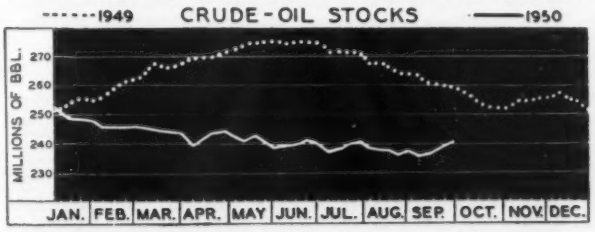
*Not including 97,585 bbl. condensate. †Including 27,236,440 bbl. condensate.

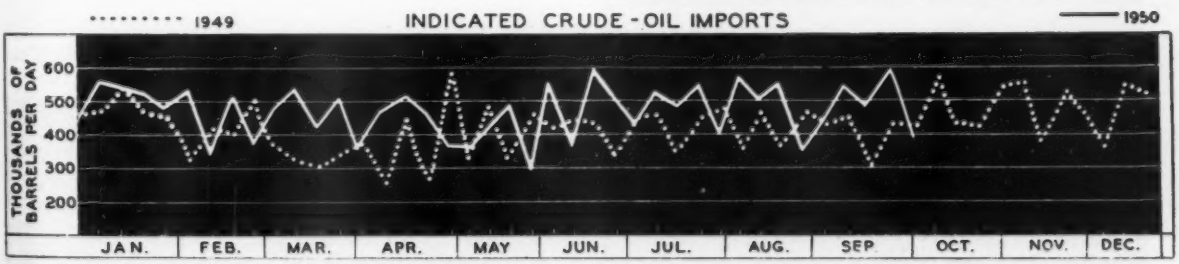
CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

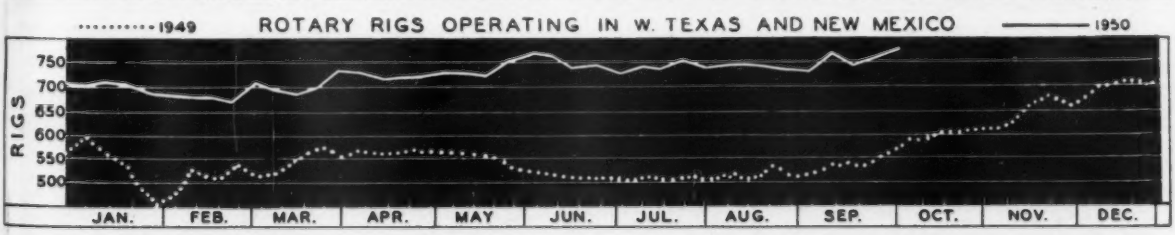
	Sept. 30, 1950	Sept. 23, 1950	Oct. 1, 1949
Pennsylvania Grade	2,314	2,395	3,191
Other Appalachian	1,324	1,313	1,922
Illinois, Indiana, Michigan	9,733	9,611	12,027
Arkansas	2,964	2,916	2,782
Louisiana	14,577	14,225	13,768
North	3,482	3,218	3,455
Gulf	11,095	11,007	10,313
Mississippi	2,665	2,617	2,623
New Mexico	6,494	6,408	7,349
Oklahoma and Kansas	35,412	35,257	39,302
Texas	119,015	117,399	118,558
East Texas	13,629	13,678	17,140
West Texas	47,190	46,150	46,517
Texas Gulf	28,757	28,454	28,944
Other Texas	29,439	29,117	25,957
Rocky Mountain	10,420	10,432	13,910
California	30,944	30,719	36,027
Foreign	5,769	6,349	6,841
Total	241,631	239,641	258,300

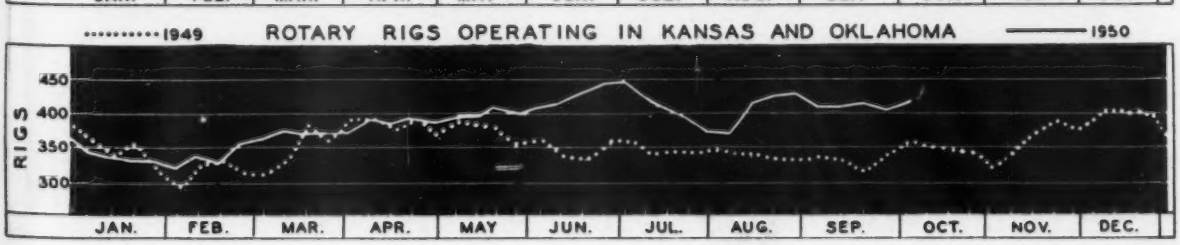
*Bureau of Mines.









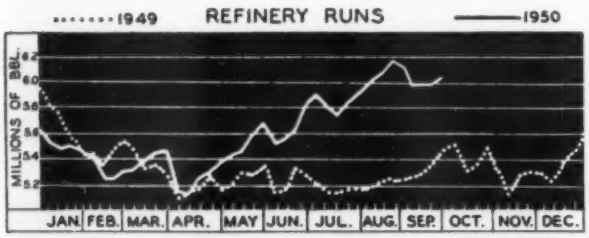


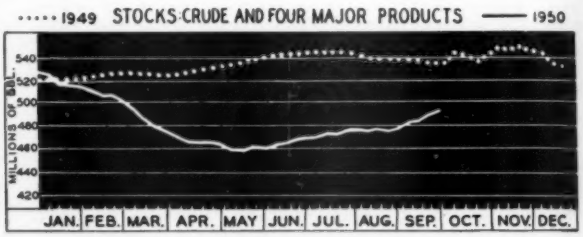
A.P.I. REFINERY REPORT, SEPTEMBER 30

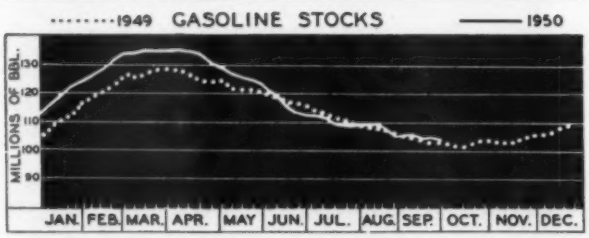
(Thousands of Barrels)

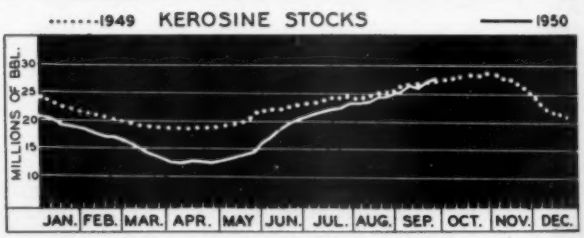
District--	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, September 1949				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,010	380.9	48.3	195.3	208.3	24,750	10,222	23,258	11,602	777	319.8	25.4	172.3	176.9
Appalachian:														
District 1	121	50.4	6.6	13.4	10.3	2,565	463	814	432	98	46.9	5.0	13.2	10.0
District 2	66	32.1	5.1	7.6	15.6	1,192	141	213	150	67	35.1	4.1	7.2	13.6
Ind., Ill., Ky.	1,019	533.9	53.0	191.3	143.4	20,521	5,831	12,758	4,532	925	501.7	57.6	126.8	142.0
Okla., Kans., Mo.	520	291.7	15.7	119.4	65.0	10,513	1,425	7,980	1,342	418	241.6	14.4	82.1	60.9
Inland Texas	216	125.4	9.4	42.6	37.0	3,261	496	1,367	729	214	140.5	10.4	27.9	42.4
Texas Gulf Coast	1,446	648.4	115.0	310.6	269.7	16,531	4,697	11,550	5,850	1,325	606.1	81.4	282.0	233.8
La. Gulf Coast	520	235.0	64.9	108.8	70.3	6,313	2,717	4,000	2,432	456	220.8	47.2	106.3	60.8
N. La. and Ark.	74	28.1	8.1	14.1	6.8	2,295	481	654	256	73	30.9	6.3	10.6	15.0
Rocky Mountain:														
New Mexico	14	7.4	.4	2.6	3.9	83	25	29	32	10	5.8	.2	1.7	2.6
Other Rocky Mtn.	180	74.9	2.9	40.6	36.7	3,078	485	2,042	799	194	89.9	5.7	34.9	33.6
California	865	395.2	23.6	162.3	319.3	13,281	866	12,069	14,134	870	375.1	12.1	136.6	318.4
September 30, 1950	6,051	2,803.4	353.0	1,208.6	1,186.6	104,383	27,849	76,734	42,330	5,427	2,617.2	269.8	1,001.6	1,110.0
September 23, 1950	5,982	2,818.0	336.4	1,116.6	1,193.7	104,739	27,632	75,079	42,319	.....	.....	.....	.....	.....
October 1, 1949	5,493	2,625.9	258.9	994.6	1,073.4	103,895	27,196	83,495	67,955	.....	.....	.....	.....	.....

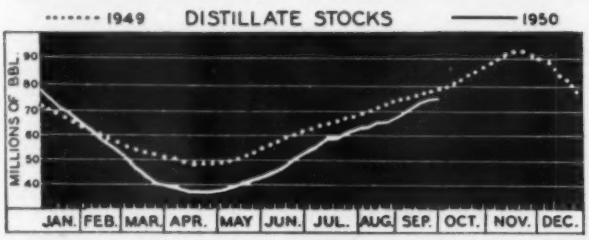
*At refineries including natural blended. †Finished and unfinished.

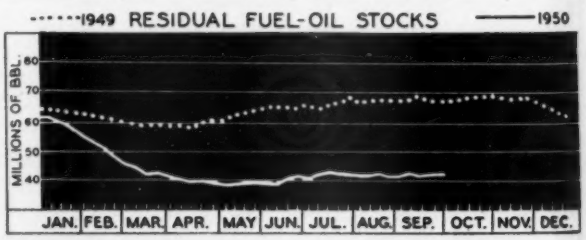


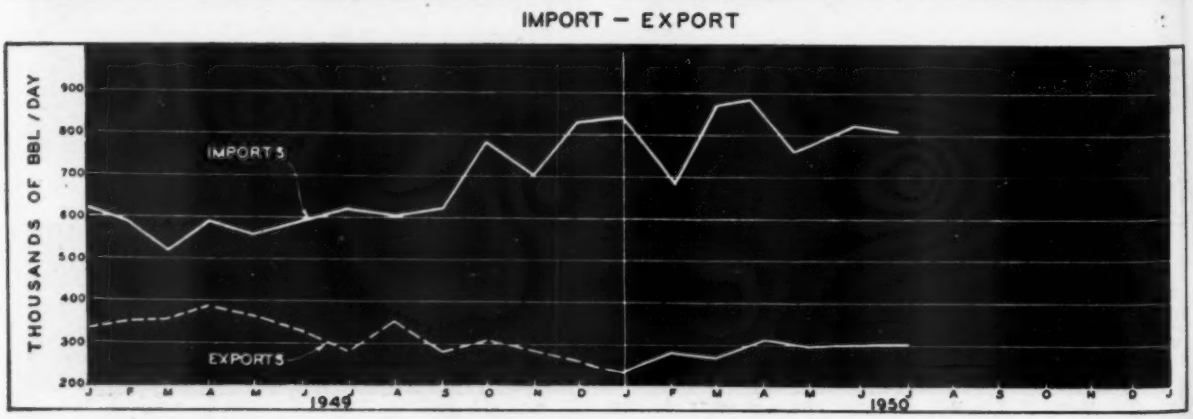












CRUDE PRICES

GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.69			
19-19.9	1.77			
20-20.9	1.85	$2.25		$2.12
21-21.9	1.93	2.27		2.14
22-22.9	2.00	2.29		2.16
23-23.9	2.08	2.31		2.18
24-24.9	2.15	2.33	$2.56	2.20
25-25.9	2.23	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.10
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

BOTH light and heavy fuels are stronger on the East Coast. The lack of balance between Gulf Coast and East Coast prices, brought about by the rapid rise in tanker rates, is being corrected in part by price advances for heavy fuel in East Coast markets. Several independent marketers have carried a price of $2.25 per barrel on the New York Harbor market since early in September, but major suppliers have failed to meet the advance until last week.

Gulf Oil Corp. announced increases in heavy-fuel prices ranging from 10 cents in Florida to 15 cents at Baltimore and points north. The increase, effective October 7, brings Gulf's posting for barge delivery in New York Harbor to $2.30. The new price has been met by Cities Service Co., and other suppliers are studying the move.

Another factor tending to bring Gulf and East Coast prices into equilibrium has been what is classified as a "temporary softening" of the tanker market. Charter rates for dirty tankers reached a high of 60 per cent over the U.S.M.C. base and have dropped back to 45 per cent over. However, this still leaves the high figure of 63 cents a barrel for moving residual from the Gulf to New York Harbor.

At the end of the week some No. 2 fuel was reported to be moving at 9.75 cents in the harbor, .25 cent above the generally posted price. Kerosine and No. 2 fuel were up .125 cent on the high for some Group 3 postings. Also, a larger part of the low-sulfur residual on the Group 3 market was moving at the high.

Some end-of-the-season softening is evident in most gasoline markets. In the Mid-Continent area the indicators are the general tone of the market and increases in gasoline offerings. On the New York Harbor market, sales were reported at 12 cents, off .5 cent from recent lows.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotation of leading suppliers as of October 9, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12-12.75	10⅜-11½
Premium gasoline, 86-88 octane	11¼-11½	13.25-13.75	11½-12
42-44 w.w. kerosine	8⅞-9⅛	9.5-9.75	8½-8¾
No. 2 straw fuel oil	8⅛-8⅜	8.5-8.6	7½-7¾
No. 6 residual	$1.65-1.75	$2.15-2.30	$1.85

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅜	5⅞	6⅛
Grade 18-55	7.65	7.15	7.4

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12.5
750 vis., No. 3-4 neutral	14.75
2,000 No. 5-6 neutral	16.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock 0-10 pp.	26-28
200 vis., No. 3 neutral, 0-10 pp.	15.5-18.5

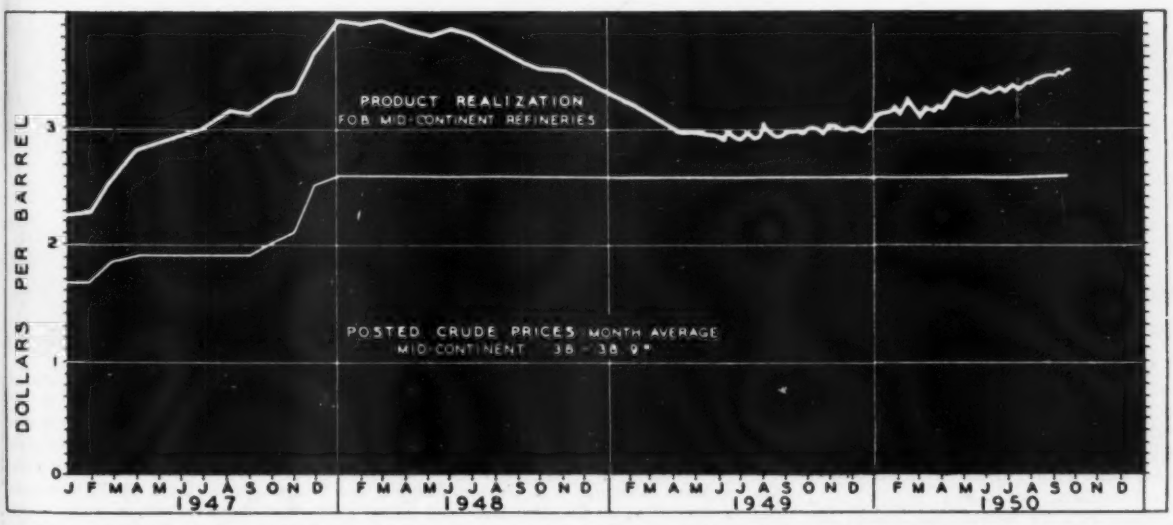
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	29.5
180 vis., 0 p.t. neutral	30.5

WAX

Mid-Continent

132-134 A.M.P.	5.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
0
1
2
3
J F M A M J J A S O N D
1947
F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.52 for week ended September 30, $3.51 for previous week, and $2.99 for September 1949.

EQUIPMENT MEN ... in the News

G. S. Badger to Represent Rector in Canadian Fields

G. S. BADGER

L. L. Rector, president, Rector Well Equipment Co., Inc., Fort Worth, has announced the appointment of Geo. S. Badger as the company's representative in Canadian oil fields.

Badger, a resident of Edmonton, Alta., Canada, has been engaged in sales work in Canadian oil fields for the past year. Prior to residing in Edmonton, he was engaged in equipment sales in California, Utah, Colorado, and New Mexico. He has also done sales and service work in oil fields of the Middle East and India.

Badger will be in charge of sales and service for Rector casing and tubing heads, Rector fulbore cementing, Rectorseal, and other Rector equipment in Canada.

R. P. Hazzard Joins M. N. Aitken Co.

R. P. HAZZARD

M. N. Aitken Co. of Houston, distributor of gas, oil, and chemical equipment, has announced the addition of a new sales engineer, Robert P. Hazzard, who will sell Robinson orifice fittings and Barton differential flow instruments.

Hazzard has had many years' experience with Girdler Corp., handling instrumentation, design, and operation of pilot plants. He is a graduate of Drexel Institute, Philadelphia.

Mase Is McKee Southwest Sales Representative

Arthur G. McKee & Co., Cleveland, engineers and contractors in the petroleum refining and iron and steel industries, has announced the appointment of R. P. Mase as the Southwest sales representative of its petroleum-refining division.

Mase will be located in Tulsa. He has been an active petroleum engineer for the past 25 years, and for the past 10 years has been chief engineer of Jones & Laughlin Supply Co., engineering and construction division at Tulsa.

General Geophysical Names Daly to West Texas Area

JOHN DALY

John Daly, former Honolulu Oil Corp., seismologist, has been named supervisor of the West Texas district for General Geophysical Co., and will make his headquarters in Midland, Earle Johnson, president, announced recently.

Daly has been in charge of seismograph work in West Texas, New Mexico, Colorado, and Mississippi for Honolulu Oil Corp. He began his career as geologist for 2 years with International Geophysics, Inc. He then served Shell Oil Co. in California for 9 years as a seismologist and geologist.

Daly is a graduate of California Institute of Technology with a B.S. degree in science and M.S. degree in geology and paleontology.

Tulsa Pipe Coating Co. Demonstrates Wheelabrator

To give pipe-line engineers, contractors, and operators an opportunity to witness the operation of the Wheelabrator, pipe-cleaning equipment working on a blast principle, Tulsa Pipe Coating Co. recently held an open house at its plant in Tulsa.

For the benefit of visitors pipe was cleaned, primed, coated, and wrapped, first with glass fiber and then with heavy craft paper. Tulsa Pipe Coating, owned and operated by Gaines Laster, I. L. Brunkow, and L. S. Rogers, is equipped to condition pipe both in its pipe yard and over the ditch.

Catalytic Construction Ups Jamison to Vice President

W. Graham Jamison has been elected vice president of Catalytic Construction Co., T. Ellwood Webster, president, has announced. Jamison will continue as company treasurer, which post he has held since the company's formation. He was formerly assistant to the controller of Sun Oil Co., and is a graduate of the Wharton School, University of Pennsylvania.

(Continued on page 175)

Tulsa Nomads Hold Fall Get-Together

Officers of the Tulsa chapter of Nomads planning the coming year's activities are, seated: Arch Campbell, Diesel Division, General Motors Corp., deputy sergeant-at-arms; G. W. Davidson, Jr., W. C. Norris Manufacturer, Inc., president; and Amos A. Roberts, Baroid Sales Division, National Lead Co., vice president. Standing are: H. M. Cooley, Bethlehem Steel Co., regent; K. O. Hoevel, National Supply Co., regent; G. F. Coons, National Tube Co., assistant secretary; J. S. George, Hughes Tool Co., sergeant-at-arms; R. E. Kirberger, Franks Manufacturing Co., treasurer; and Gilbert Swift, Well Surveys, Inc., assistant treasurer. One officer, Opie Dimmick, Century Geophysical Co., secretary, was not present for the picture. The occasion was the fall party and get-together of chapter members and guests, held at the Tulsa Country Club.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

EQUIPMENT FOR SALE

6,218 FEET 7" O.D. 17# new seamless casing H-40 Rg 2 @ 2.90 ft. Phone 5-8850, Tulsa.

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES. E. A KELLY, BOX 861, OKLAHOMA CITY PHONE 5-6407.

WELL equipment. New and used spudders, rotaries, core drills, all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools rented. Everything for well service. Pressey & Son, Pueblo, Colo.

FOR SALE: 300 Amp Westinghouse welding machine powered by 6-BK Waukesha engine. Completely overhauled. Less than 50% of new price. Melton Supply Company, Box 1360, Seminole, Oklahoma.

BARGAIN FOR QUICK SALE

Large Steam Rig Complete Ready to go. 14x14 Engine, 18" & 20" Pumps, 10,000' 4½ Drill Pipe, 136' Drk All 300 Ton Equipment. Everything Good Condition. **McDaniel & Beecherl Drlg. Co.**, Phone: Randolph 6910, Dallas, Texas, or Phone 3651, Odessa, Texas.

FOR SALE

2500'—10" O.D. 5/16" Wall Used P.E. Line Pipe. Excellent Condition

Buckeye Supply Company

P.O. Box 751, Zanesville, Ohio

FOR SALE

Approx. 30,000' 8" PE used line pipe, cut out in double random lengths. Located at Lovell, Wyoming.

Brown Pipe & Machinery Co.

P.O. Box 2368 **Phone 3-9391**
Corpus Christi, Texas

New Seamless Line Pipe

20,000' 16" O.D. x .312 Wall Spec. 5LX42.

225,000' 8⅝" O.D x .277 Wall Spec. Grade B5L.

All seamless A.P.I. 30 to 44 ft. DRL, Plain Ends beveled. Write for complete delivery schedules and prices.

MID-STATES PIPE & SUPPLY CO.

Box 2334 **Ph. 2-9128**
Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

NEW 24" O.D. PIPE

7,000 ft.—24" O.D. Pipe, ¼" wall, Republic Electric Fusion Weld, 30' lengths, Plain Ends beveled. Location: Harvey, La.

MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128 **Tulsa, Okla.**

EQUIPMENT FOR SALE

FOR SALE: Wichita 50-Hercules engine—tools—lines—pipe sufficient for 2500 ft. hole. F. E. Hunt, Adair, Iowa.

Several Army Surplus 4½" x 8" Gaso Duplex 1860 Pumps — two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

FOR SALE
USED DRILLING EQUIPMENT

POWER EQUIPMENT

1—Wilson Titan drawworks unit and compounding transmission on subbase driven by 2—LRO Waukesha gas engines butane equipped, including 40" Parkersburg hydro brake package, plain cathead driller's side, American simplomatic breakout cathead opposite driller's side. Location: Elk City, Okla. Price ..... **On application**

1—Wilson Giant rig powered by 2—L-600 Cummins diesel engines, fitted with plain cathead driller's side, American simplomatic breakout opposite side. Location: near Seminole, Okla. Price ..... **On application**

STEAM EQUIPMENT

At Baxterville, Miss.

3—150 H.P. 350# W.P. Kewanee Boilers, Lot **$12,000.00**

2—15" x 7¾" x 20" Series 20 Oil Well Steam Slush Pumps, Lot **$3,000.00**

1—Boiler feed unit complete including 2—Ideal 10" stroke steam pumps, 2—5KW Turbolite generators and firing control mounted on 8" steel skid **$1,000.00**

At Houston, Texas

1—14 x 14 Ideal, Series A, National Drilling Engine with lubricator and cut-off valve **$6,500.00**

1—Union Tool, Series 239-F, Drawworks with 40" single hydromatic and multiple-jaw cut-out couplings, unitized oil bath, by Hunt Tool Company, complete with Foster Spinning Cathead and American Breakout Cathead, Grizzly Turnback; has made three 9,500' wells since being reworked **$9,750.00**

1—15½, 7¾ x 20, Gardner-Denver pump with lubricator **$2,500.00**

1—125 HP, 300# WP Kewanee boiler, with dome over barrel 72" Fire box, all standard fittings including Volcano burners **$2,000.00**

2—125 HP, 300# WP, Farrar & Trefts welded barrel boilers with domes over barrel, 84" fire box, including all fittings and Volcano burner and boiler jacks. $2,750.00 each ..... Both **$5,500.00**

1—100-TA Bethlehem Swivel Complete (overhauled), **Alice, Texas** **$1,100.00**

1—EH-7 Sheave Reagan Crown Block, **New Iberia, La.** **$1,250.00**

1—66" 4-Sheave Emsco Traveling Block, **Lindsay, Okla.** **$350.00**

1—Used Oilwell #200 Crown Block w/ 6—36" sheaves grooved for 1⅛" wire line, **Elk City, Okla.** **$500.00**

Used on but one well since being completely overhauled and having new races and bearings installed.

Box D-702, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: 1942 Model Fort Worth Jumbo "C" Spudder in good repair and complete with tools. Skid type Advance Rumley pipe pulling unit capable of 4000' well servicing also in good condition. Large supply of cable tools also for sale. G. W. Hicks, Moline, Kansas.

FOR SALE

9—230 H.P. Bessemer Type 10 Engines with compressors, Steel Buildings, Valves and Fittings complete for installation. Located Salem, Illinois Oilfield.

ENGLE PETROLEUM, INCORPORATED
Box 655, Evansville, Indiana
Telephone 5-5179

WOOD TANKS

OAK AND CYPRESS BREWERY TANKS

4—Size 10' x 17', closed 2¼" staves, manholes, etc. ..... $500.00 ea.

All clean, knocked down, F.O.B.

C. R. Sherrill

Route #1

Burrton, Kansas **Telephone 2-1006**

BUTANE AND HOT OIL PUMPS

1—Slightly Used Dean Bros. 8"x 7"x18" Simplex Close Clearance Pump, For Liquid Petroleum, 90 GPM—400 PSIG, Ea. $750.00

1—Slightly Used Dean Bros. 12"x 7"x18" Simplex Close Clearance Pump, For Liquid Petroleum, 90 GPM—400 PSIG, Ea. $750.00

1—Slightly Used Union 14"x8"x 12" Simplex Hot Oil Pump, Special Forged Steel Fluid End, 750# 650° F. 100 GPM, Ea. $500.00

1—Slightly Used Snow 10"x4½"x 12" Duplex Hot Oil Pump, Special Forged Steel Fluid End, 750# 650° F. 146 GPM, Ea. $500.00

2—Slightly Used Union 7½"x4½" x10" Duplex Hot Oil Pumps, Special Forged Steel Fluid End, 750# 650° F. 132 GPM, Ea. $500.00

ALL HOT OIL PUMPS TESTED 1200#

H. A. McCarthy

310 Thompson Bldg. **Phone 5-3296**
Tulsa 3, Okla.

DRILL PIPE

10,000 ft. 3½" OD used seamless, weighing approx. 13# per foot, with tool joints.

USED SEAMLESS STEEL TUBING
Plain End Beveled for Welding

75,000 ft. 2¼" OD, approx. 2.90# per ft.
25,000 ft. 3½" OD, approx. 5# per ft.
25,000 ft. 4" OD, approx. 6# per ft.
25,000 ft. 5½" OD, approx. 9# per ft.

All reconditioned, hydrostatically tested to 850# pressure.

• • • • • •

18,000 ft. 6" OD used electric welded steel pipe, approx. ⅜" wall, 24' lengths.

• • • • • •

All material guaranteed in first-class condition. All ready for IMMEDIATE SHIPMENT.

• • • • • •

New and Guaranteed Used STEEL TANKS, Riveted, welded and bolted, in all capacities; also WOOD TANKS.

A. GREENSPON PIPE CO., INC.
3615 Olive St., St. Louis 8, Mo.
LUcas 5651

EQUIPMENT FOR SALE

WAR SURPLUS MACHINERY
Gaso, Byron Jackson, Aurora, Wayne, Lombard & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

A BARGAIN: 2500 foot rotary rig complete, with mast, 4½" Drill pipe, and two ton truck. Jewell Jackson, Holdenville, Oklahoma.

EQUIPMENT FOR SALE

TO SETTLE ESTATE: Two hydraulic casing pulling machines, mounted on skids, complete with small tools, also extra equipment for large size casing. One unit with friction clutch winch. Sell as one lot only. Reasonably priced. Located Tulsa. Box D-686, The Oil and Gas Journal, Tulsa, Oklahoma.

2—100 HP. Superior Twin Gas Engine COMPRESSORS—located in Oklahoma. 1-K428 Buda Oilfield Engine. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

PIPE FOR SALE

NOW AVAILABLE—150 Miles 8⅝" OD Strictly #1 Grade Used 28.55# Welded Steel Line Pipe Double Random Lengths Beveled Ends. Located Dallas-Corsicana area.

Standard Pipe Supply Company

P.O. Box 243, Houston 1, Texas

FOR SALE

50,000' 2⅜" O.D. 3.75# & 4# Good Used Lapweld Line Pipe, 11½ V-Thd.

125,000' 4" O.D. x .165" Wall Seamless, 6.5#, Used as sweet gas line and will be taken up in 30' Lengths within the coming week; available for inspection thereafter, FOB Borger, Texas.

25,000' 5" O.D. x .438/.563" Wall New Seamless, 20'-32' Lengths.

CASING & TUBING

35,000' 2⅜" O.D. 4# Good Used Lapweld Range 1 Tubing with New 10 Round Threads and Collars.

40,000' 5½" O.D. 10# Seamless Reconditioned Range 1 T & C Casing with New 11½ V-Threads and New 5⅛" Collars (Good for Shallow Wells.)

10,000' 8⅝" O.D. 25# Good Reconditioned Casing. New 8 Round Threads and New 7¾" Collars.

3,000' 10¾" O.D. 32.75# Good Reconditioned Casing with New 8 Round Threads and New 8" Collars.

FOR FURTHER INFORMATION, WIRE OR PHONE AT ONCE

A. J. STRUBEL

SIDney 1791 ... 4946 Murdoch, St. Louis, Mo.

LIQUIDATION SPECIAL!

COMPLETE WATER TREATING UNIT

Hot Lime System

3200 G.P.H. Make-Up 18000 G.P.H. Condensate

Manufactured by Permutit.

Consists of:

Chemical feed tank 5' x 3' 8" w/motor driven agitator.
Chemical pump.
Hot lime soda filter 5'6" x 7'4", 4300 G.P.H. capacity.
Wash pump for above.
Hot lime soda deaerator and softener 9' x 26' on 9' stand.
All controls, valves, fittings, etc., necessary for operation.

FIRST CLASS CONDITION IN EVERY RESPECT

WRITE — WIRE — PHONE

FOR COMPLETE

INFORMATION AND

OTHER LISTINGS

DULIEN STEEL PRODUCTS, INC.
of Washington
P. O. BOX 667
COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT FOR SALE

MACHINE SHOP EQUIPMENT

No. 4-A Warner & Swasey Univ. Hollow Hexagon Turret Lathe, 8" hollow spindle, threading attachment.
6" Cox Pipe Threading & Cutting Machine, AC MD, with Landis head.
All kinds of machine shop equipment.

COX MACHINERY CO., INC.
P. O. Box 1953 Cincinnati 1, Ohio

NEW PIPE

10¾" OD—1600 feet, 40.48 lb. per foot, 20 foot lengths, P.E.—Lapweld.

20" OD—1000 feet, 5/16" wall, 16 to 40 foot random lengths, P.E.—Seamless.

24" OD—1400 feet, 5/16" wall, 26 to 40 foot random lengths, P.E.—Seamless.

Write—Wire—Phone

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X-639)
Kansas City 18, Kansas
THatcher 9243

BARGAIN for Quick Sale: 15 New, No. 16 Underpull Jacks, manufactured by American Mfg. Co., with Oil Bath Bearings and Oil Seal Rings with Bushings. Service Supply Company, Box 485, Greggton, Texas.

CORE-DRILL Equipment for Sale: Franks Model "2,000" rig, mounted on KR-11 International Truck, complete with 38' derrick, Gardner-Denver 5x8 power mud pump, 2,000 watt Kohler light plant, and standard operating accessories. Contact Mr. J. D. Baker or Mr. W. H. Hawkes, P.O. Box 1654, Oklahoma City, Oklahoma. Telephone No. 2-6381.

CASING: Good used lapweld, 5½"-13 lb. V threads $1.45; 7" OD 17 lb. $1.50; 6,000 ft. 7"-20 lb. $1.55; 5,000 ft. 5½"-17 lb. J-55 R2, seamless $2.65 ft.; 10,000 ft. 2" 4½ lb. lapweld tubing 36c ft. PHONE 7-5121. H. P. McGinnis, Tri-State Tool and Supply Co., Box 827, Parkersburg, West Va.

FOR SALE at Odessa, Texas: 1 used 125 HP, 300# Working Pressure Donovan ASME Code Boiler equipped with Elesco Superheater and Fittings, purchased new 1936, $2500. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: 5,000' of 8⅝" OD 20#—24# Lapweld pipe, P.E.; and 2,000' of 8⅝" Spiralweld, $1.35 per foot. Good condition. F.O.B. Dallas, Texas. Otis Morgan Pipe & Supply Co., Wichita Falls, Texas.

FOR SALE

USED EXPANSION JOINTS FOR 18" and 24" PIPE, 7½c per lb., FOB, Toledo, Ohio.

THE ELYRIA BELTING AND MACHINERY CO.
Box 5 Elyria, Ohio

AVAILABLE for sale and immediate shipment #1 T & C 2" line pipe, seamless and lapweld casing, tanks. Call or write Edco Pipe & Supply Company, Box 565, Drumright, Oklahoma.

FOR SALE: Mayhew 1000 Shot Hole Drill, on contract. Owner called to service. Box D-711, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: At Bartlesville, Oklahoma, 1 Used ELI Model M-5, Shothole Drill with 4" x 5" GD Pump, Mounted on 1945 Ford Truck $1250.00. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE at our Lacy Plant, Seminole Field, 3—10'x40' Horizontal Welded and Riveted Gasoline Storage Tanks, $1500.00 each. Cities Service Oil Co., Patridge, Bartlesville, Okla.

6" OIL HOSE

SUCTION & DISCHARGE for gas or oil service 20' lengths with built-in nipples and flanges attached. New. Bargain. J. C. Martyns, 24-16 Jackson Ave., L.I. City, N.Y.

FOR SALE: 2500 ft. 3½" regular drill pipe, 4¼ Acme joints, 1 drill collar for same. Model 60 Brewster draw works less motor, bargain. Phone 7-3161, 433 East Morris, Wichita, Kansas.

4—175 H.P. Heine Water Tube Boilers. 24—6" Series 1500 Flanged End T & G Nickeladium Steel Ells. 38—24", 80—20", 40—18", 122—16", 50—10" Steel weld-neck and Slip on Flanges. Bourland Supply Co., Pampa, Texas.

TWO Gardner-Denver Compressor Units size 12 x 11 and 4¾ x 11, direct connected with 100 HP electric RPM motor, complete with all equipment; located at Refugio, Texas; in service forty-five days. Will take reasonable discount. Clymore Petroleum Corporation, 238 Kaffie Building, Corpus Christi, Texas.

7¼ x 12 USED Gardner-Denver Mud Hog Pump. See at Garrett Equipment Co., Wichita Falls, then contact D. F. MacKinnon, 3200 Main Street, Dallas, Texas, Phone RAndolph 6415.

FOR SALE: Bucyrus Erie Spudder, 36 L, late 47, on wheels, casing truck, reinforced mast, Buda Diesel or Buda gasoline and natural gas motor, knock down house, timbers, walk, guy line and stakes. Excellent condition. Ten Thousand. Tools 50% list. Ed Obermiller, 140 Sixth St., North Canton, Ohio.

FOR SALE: Erected near Russell, Kansas, 2—94' API Moore Angle Iron Drilling Derrics 333,000# Capacity with Crown Blocks each $500.00. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: 30,000 ft. lap-welded machine-cleaned used 8-inch gas line pipe. Weighs 28.55 lb. per ft. Good condition. $1.30 per ft. FOR SALE—1500 tons new 5½ in. and 7 in. black oil well casing pipe. Weighs 15½ and 23 lbs. per ft. $260 per ton. Pittsburgh Sheet Steel Co., 4225 Winterburn Ave., Pittsburgh 7, Pa. Phone JAckson 1-6105.

FOR SALE near Madison, Kansas, 3—4 Bandwheel and Geared Pumping Powers Complete. Inventory on Request. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE at Bartlesville, Oklahoma, one used Franks Manufacturing Company, Tulsa, Model 1000 Shothole Drill, 1000' Capacity, 10' Telescoping Hydraulic, 4" x 5" GD Mud Pump bought new 1943, Mounted on and Driven by 1942 Ford Truck, $2750. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

BOILERS FOR SALE: 18 Code Oil Field Boilers, 50 to 87 H.P., 100 to 200 Lbs. W.P., Operated Under Hartford into 1948, Not Fired Since. Located on Leases Vicinity Pampa, Texas. Offered Subject to Prior Sale. $500.00 to $700 each, as is, where is. Contact Max Harbison, Kewanee Oil Company, Pampa, Texas.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908 Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa, 3, Oklahoma.

FOR SALE

Open bids are being accepted on the following equipment:

1—"2000" Franks Core Drill Unit mounted on 5 Ton 1944 Model International truck with Timken Tandem Drive complete with 5 x 8 Gardner-Denver Mud Pump; traveling blocks, hydraulic pumps; tubing elevator; casing elevators; drill collars; overshots, 2109 feet drill pipe and 1—1½ KW Kohler light plant.

2—International 1948 Model KB7 stake body trucks each with 780 gallon skid-type water tanks.

1—5 ton Fruehauf Pole trailer.

1—300 gallon gasoline trailer.

Miscellaneous items including small tools, small pumps, fire extinguishers, pipe rack, pipe straightener; chain hoist, etc.

Above equipment is in excellent condition and may be inspected at our Hastings Field Storehouse midway between Pearland and Alvin, Texas. Call, wire or write:

STANOLIND OIL & GAS COMPANY
Attn.: Mr. O. T. Craig, P. O. Box 3092, Gulf Building, Houston 1, Texas

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FOR SALE
100,000 Ft. 5½" OD Seamless Casing

For gas and oil well drilling to depth of approx. 2300 feet; a strictly No. 1 "blue ribbon" grade.

★ ★ ★

30,000 FT. 18" OD x .281" WALL
31,000 Ft. 26" OD x .281" WALL
ELECTRIC WELD STEEL LINE PIPE,
plain end, beveled, 40' lengths.

★ ★ ★

IMMEDIATE SHIPMENT OUT OF STOCK ON ALL OF ABOVE

☆ ★ ☆

ALSO FINE STOCK OF LINE PIPE, BOTH NEW AND USED, FROM 2" to 42"

★ ☆ ★

LOUIS GREENSPON, INC.
2335 Brown Rd., Overland 14 (St. Louis Co.), MO.
Telephone WInfield 5130

EQUIPMENT WANTED

ONE used Gardner-Denver pump, F X F, No. 172, (4x5) must be in A-1 condition. Will pay 50% of list price. Chas. W. Scott, 6129 Berkshire Lane, Dallas 5, Texas, Phone EMerson 6500.

WANTED: 6000′ of 2″ J-55 new upset tubing, in trade for 6000′ of 2½″ H-40 & J-55 new upset tubing, at Post, Texas. PRospect 8194, 1503 First National Bank Building, Dallas.

WANTED: Used, LATE MODEL mud pump, EMSCO 7½ x 12 or 7½ x 14 size. Box D-717, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Used FAILING 1500, MAYHEW 2000 rig complete and in good shape, late model, not over four years old. Box D-720, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: USED 4½″ DRILL PIPE Box D-606, The Oil and Gas Journal, Tulsa. Oklahoma.

WANTED: 160′ of 16″ OD, ¼ to 5/16″ wall, PE, RL pipe. Must be good, new preferred. Judd & Son, Shullsburg, Wisconsin.

WANTED TO BUY: 16″ O.D. and 10″ O.D. 8 or 10 thd. 13⅜″ and 9⅝″ 8 thread collars, new or used. Box 574, Tulsa, Okla.

WANTED REFINERY

4,000 or 5,000 bbl. complete refinery that can be dismantled and moved export.

BEESON ENGINEERING CO.

MUtual 9151 **1628 East 7th St.**
Los Angeles 21, Calif.

WANTED

Refining Equipment used but in good condition Columns, Furnaces, Exchangers, Others.

Make specific offers to:

INDUSTRIAL OVERSEAS TECHNICAL CORP.

Mr. L. M. Jarach

120 Wall Street **New York 5, N. Y.**
Telephone DIgby 4-7850

WANTED!

Pipe Threading Machines

6″, 8″ and 12″

Landis or Bignall & Keeler with Landis Heads. Machines must be in good working order with individual motor drives. Give complete description including make, model and serial numbers, width of dies or chasers, motor specifications and prices.

CENTRALIA PIPE & SUPPLY CO.

Box 454—Tele. 6771

Centralia, Illinois

HELP WANTED

JUNIOR CORROSION ENGINEER for Midwest pipe line company. Familiar with D.C. meters; B.S. in electrical or electrochemical engineering; also other pipe line jobs. Box D-697, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Engineer familiar with Gas-fired Unit Heater design. Box D-701, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS

Only Experienced Men Need Apply

WRITE ONLY

WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

HELP WANTED

PROGRESSIVE well financed closely held company desires individual experienced in development and direction of exploratory drilling as well as production in Kansas and Rocky Mountain Regions. Will form company for right man to participate. Lease areas now are under consideration. Box D-725, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

EXPERIENCED Seismologists and Seismic Computers by large, well established geophysical company. Give full details of education and experience in letter. Reply Box D-707, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Seismic Party Chief. Excellent opportunity. Good, sound connection. Furnish full particulars regarding experience. Reply Box D-705, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST widely acquainted in Oklahoma to trade in and develop shallow drilling deals for a group of New York independents. Salary and override to the right man. Reply Box D-709, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Between ages 25-45, man with engineering training and sales experience in diesel engine field. Application knowledge required. Work on salary and bonus. Inquiries confidential.

Box D-716, The Oil and Gas Journal, Tulsa, Oklahoma

Wanted—Instrument Man

With experience in oil refinery and chemical plant instruments. Denver, Colorado location. State age, experience and salary expected in first letter. Reply Box D-712, The Oil and Gas Journal, Tulsa, Oklahoma.

ESTIMATOR

Experienced ENGINEER familiar with Oil Refinery design and capable of estimating process equipment from flow diagrams.

Give full information, experience record and salary expected.

ARTHUR G. McKEE & CO.

2300 CHESTER AVE.
CLEVELAND 1, OHIO

PROJECT ENGINEER

Prominent Engineering and Construction Company, located in New York City, requires Project Engineers to coordinate and direct engineering work in connection with the design and construction of petroleum and chemical plants. M.E. or Ch. E. graduate with practical petroleum refinery engineering and construction experience required. Position is permanent with excellent promotional opportunities. Detailed resume of experience and photograph desired at

Box D-688

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

GEOPHYSICIST with geological training. Extensive experience in seismic interpretation. Review work. Stable location. Reply Box D-706, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer or Geologist with experience in evaluation and subsurface studies in Gulf Coast wanted by sound independent. Age 30-45. In application state salary expected and enclose college transcript. Box D-631, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST — Thoroughly qualified for intensive review and re-interpretation of Gulf Coast and West Texas seismic data. Established Houston Office with old, successful company now expanding. Submit detailed statement qualifications, experience. Reply Box D-704, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND MAN for large producing company. Must be well rounded with several years experience. Replies will be confidential. Box D-683, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions — $3600 to $30,000. This confidential service for outstanding men who desire a change of connection will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates. 1204 Berger Bldg., Pittsburgh 19, Pa.

INSTRUMENT Engineer: Mechanical Engineering graduate preferred with several years experience on instrument maintenance and engineering, preferably in Chemical Plant or Petroleum Refinery. Age 26 to 35. Location, New Mexico. Box D-718, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

SALES ENGINEER: Experienced Houston area will represent your process plant equipment. Box D-723, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: Law Degree, ten years oil and gas experience with major companies, including secretarial, clerical, abstracting, lease records, title curative. Single, exempt military service. Desire position with solid independent. Box D-714, The Oil and Gas Journal, Tulsa, Oklahoma.

DIESEL AND GASOLINE Mechanic experienced on earthmoving equipment, compressors, welders, cranes, hoists, etc. Available short notice. Box D-721, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED SALES ENGINEER now available to represent manufacturer of any type oilfield equipment. Well known among domestic and export purchasers. Valuable experience on heavy equipment last five years. Box D-726, The Oil and Gas Journal, Tulsa, Oklahoma.

AVAILABLE Gravity Meter Party Chief, nine years experience foreign work, civil engineer's degree, desires position as gravity meter party chief or engineer in foreign service. Excellent references. Box D-708, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER, 35, Diversified and responsible process design experience on catalytic cracking, distillation, gas recovery units. Overall processing studies. Cost analysis. Technical writing. East preferred. Employed. Box D-727, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 34 yrs., married, with 12 yrs. of extensive major and independent company experience in all phases of petroleum exploration and development in Texas, Louisiana, and New Mexico. Prefer connection with active independent. Excellent references. Box D-715, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE ENGINEER, 28 yrs., married, with major company experience in Production and Drilling desires job with aggressive contractor or independent producer. Box D-687, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED PETROLEUM CHEMIST available, interest in research and development, supervision, and analysis. Will send qualifications. Box D-685, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

AVAILABLE OCTOBER 15TH, high class man, 27 years experience, now employed as general manager of partnership operating oil producing and ranch properties South Texas. Change necessary account death of partner and sale of properties. Am also experienced accountant, tax, office and field management. Box D-696, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE LINE corrosion and communications engineer desires to advance by changing. Present responsibilities include complete supervision of extensive radio and cathodic protection facilities major gas and electric company in the Northwest. Licensed radio operator experienced with all phases microwave communications. Age 33, ten years in pipe line and allied fields, will consider foreign assignment. Box D-694, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION Superintendent, 35 years' experience in 3 southwest states, desires supervision small property East Texas area. Excellent qualifications building up old production. Available January 1, 1951. Box D-690, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—17 years' experience as geologist, lease foreman, tool pusher, petroleum engineer, mechanical engineer and secondary recovery with independents and majors in Texas, Oklahoma and Kansas. Would prefer sales engineering job with sound future or petroleum engineering job with independent. Box D-699, The Oil and Gas Journal, Tulsa, Oklahoma.

SINGLE GIRL, now employed as a Geologist, desires position with independent oil company. Address inquiry to Box D-710, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Project Engineer Catalytic Cracking & Distillation Units available for responsible position. Chemical Engineer age 36. Address Box D-724, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

WANT TO TRADE winch trucks including tandems, bulldozers, pickups, misc. tools and equipment and welder. All equipped for oilfield work for interest in drilling rig. Experienced. Phone 6-4020, Evansville, Indiana.

FOR SALE

TITANIA GEMSTONES

Can supply the new sensationally beautiful synthetic titania gemstone "rainbow diamond," facet cut, showing greater brilliance than the diamond and at a small fraction the cost. Harder than amethyst. Christmas is coming.

C. C. BOAK—Tonopah, Nev.

ADDRESS WANTED

WANTED: To know the address of Mr. John Wood. He is an oil field employe working as a driller or cementer. He has worked in South Texas and Snyder area. Mr. Wood is married and has four children. He is blond with light complexion, and his weight is approximately two hundred pounds. We will pay the first person giving us his correct address and employer $10.00. Contact Black & Baird, P. O. Box 207, telephone No. 1429, in Alice, Texas.

ROYALTIES

DEEDED ROYALTIES

San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES

Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

SERVICES

SURVEY SERVICE

The next well you drill will be a producer, if, you use the most unique service of all times, an immediate decision rendered. A demonstration will convince the mind of any man. The gamble is too great, you cannot afford to go without it. Box D-664, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorney, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

WANTED

WANTED: SURPLUS Chemicals, Oils, Waxes, Solvents, Wastes and Residues of all kinds. Chemical Service Corporation, 98-06 Beaver St., New York 5, N. Y.

MANUFACTURERS' AGENT

Manufacturers' agent covering Gulf Coast oil fields, refineries and process plants, seeks additional line. Maintains office, warehouse and shop in Houston and eight sales engineers in the field.

Box D-713, The Oil and Gas Journal, Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

OREGON LEASES: Have for lease 36,000 acres and can get additional 50,000 acres that is adjacent. Vicinity of Mitchell well. If interested write H. H. Schmitt, Prineville, Oregon.

WANTED TO BUY: Producing leases. Southwest Texas district preferred, but will consider all. Write Box D-719, The Oil and Gas Journal, Tulsa, Oklahoma.

U. S. LANDS can be filed for Government oil lease. Good geology. Opportunity in developing area. Need some associates. S. W. Pressey, Pueblo, Colo.

OIL AND GAS LEASES, Shelby County, Texas. Holdings in and around active major company blocks. Write for full details. Box D-722, The Oil and Gas Journal, Tulsa, Oklahoma.

NEAR TULSA—6 thousand-foot wells: five sand and one lime. Lime well never completed, equipment alone worth the price $8,000. F. E. Brown, Coweta, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

ALBERTA
Leases and Royalties
ALBERTA LEASEHOLDS
131-Ninth Avenue West
Calgary, Alberta, Canada

EQUIPMENT MEN

(Continued from page 170)

Lee C. Moore Reorganizes Division Sales Staff

O. H. DITTMER

H. J. Woolslayer, Lee C. Moore Corp., has announced the appointment of O. H. Dittmer as division sales manager in charge of the Oklahoma, Kansas, Illinois, and Rocky Mountain areas. Dittmer was employed by Cosden Oil & Gas Co. in Tulsa before joining Lee C. Moore in 1922. With offices in Tulsa, Dittmer will be assisted by three newly appointed sales representatives.

With headquarters in Great Bend, Kans., Marion L. Eneff will cover the Kansas and Rocky Mountain areas. Eneff started to work with Lee C. Moore organization in 1945 as a warehouseman. He is a graduate of Okmulgee Business College. R. N. Storer, a Lee C. Moore employe since 1942, will cover the Illinois, Indiana, and Kentucky areas from his headquarters in Centralia, Ill. Like Eneff, Storer started with the company as a warehouseman.

In addition to wide industrial and sales experience, Storer has operated the Lee C. Moore store at Centralia and has done sales and service work for the company.

Appointed to cover the Oklahoma territory with headquarters in Tulsa is Don Todd. Todd has come up through the national control and purchasing department of Lee C. Moore since joining the company in 1946. Todd majored in general business and marketing at Oklahoma A. & M. College.

Rackley Elected President Of Jessop Steel Co.

Frank B. Rackley, formerly executive vice president of Jessop Steel Co., Washington, Pa., was elected president of the company at a recent meeting of the directors. At the age of 33, he is the youngest president of a steel-producing company in the United States. Rackley joined Jessop Steel in June 1948 as general manager of sales. He was made vice president in charge of sales in October 1948, and executive vice president in May 1949.

Prior to joining Jessop Steel, Rackley was manager of stainless sales for the western area of Carnegie-Illinois Steel Corp. He began his career as a file clerk and office boy for the corporation in 1936 and was steadily promoted to positions of increasing responsibility.

XUM

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Statement of the Ownership, Management, Etc., of

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October 12, 1950

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Known bondholders, mortgagees and other security holders holding 1 per cent or more of the total amount of bonds, mortgages or other securities: None.

S. H. ROURKE,
Business Manager.

Sworn to and subscribed before me this 2nd day of October, 1950.

JOHN P. GALLAGHER,
Notary Public.

My commission expires March 1, 1951.

CALENDAR OF EVENTS

October

Western Petroleum Refiners Association, regional meeting, Gladstone Hotel, Casper, Wyo., October 12-13.

West Virginia Geological Survey, conference on secondary recovery of oil in West Virginia, Morgantown, W. Va., October 13-14.

Oil Progress Week, October 16-21.

National Safety Congress, Chicago, October 16-20. Petroleum Section, October 17.

Texas Independent Producers and Royalty Owners Association, directors' meeting, San Antonio, October 18.

American Association of Petroleum Geologists, Pacific Section, Ambassador Hotel, Los Angeles, October 19-20.

Society of Economic Paleontologists and Mineralogists, Pacific Coast Section, Ambassador Hotel, Los Angeles, October 19-20.

Society of Exploration Geophysicists, Ambassador Hotel, Los Angeles, October 19-20.

Permian Basin Oil Show, Odessa, Tex., October 19-22.

Independent Natural Gas Association of America, annual meeting, Shamrock Hotel, Houston, October 23.

American Institute of Electrical Engineers' fall general meeting, Skirvin Hotel, Oklahoma City, October 23-27.

American Society of Mechanical Engineers, Fuels Division, annual joint fuels conference, Hotel Statler, Cleveland, October 24-25.

National Lubricating Grease Institute, annual meeting, Edgewater Beach Hotel, Chicago, October 30-November 1.

November

Mid-Continent Oil and Gas Association, Louisiana-Arkansas Division, annual meeting, Roosevelt Hotel, New Orleans, November 2-3.

New Mexico Geological Society, first annual conference, San Juan Basin; headquarters, Albuquerque; November 3-5.

Society of Automotive Engineers, Fuels and Lubricants meeting, Mayo Hotel, Tulsa, November 9-10.

California Natural Gasoline Association, Silver Anniversary, Los Angeles, November 9-10.

American Petroleum Institute, annual meeting, Biltmore and Ambassador Hotels, Los Angeles, November 13-16.

American Society of Mechanical Engineers, annual meeting, Grand Central Palace, New York, November 27-December 1.

Southwestern Geophysical and Geological Conference, Hotel Texas, Fort Worth, November 30-December 2.

December

American Institute of Mining and Metallurgical Engineers, annual joint meeting, Texas sections, Texas Technological College, Lubbock, Tex., December 1-2.

American Institute of Chemical Engineers, annual meeting, Columbus, Ohio, December 3-6.

Interstate Oil Compact Commission, winter meeting, Shamrock Hotel, Houston, December 11-13.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month. Jonathan Club.

New York Nomads, dinner meetings, October 2 and November 6, Louis Sherry's; annual Christmas dance, December 9, Hotel Pierre.

2 signs of valuable "finds"

What's sweeter music to a "sourdough's" ears
than the bray of his burro? Why, it's the clicking of his
Geiger Counter telling him uranium's at hand . . .
and the louder it clicks the better the lode.
That's why prospectors today carry and count on the Geiger
to tell them when they've made a VALUABLE "FIND."

You don't need a Geiger Counter to hit the mother-lode
in wire rope value. Just look for the HAZARD REEL. It's the
sign of a wire rope that users everywhere recognize
and rely on for uniformity, longer service, easier handling
and utmost dependability. It's the sign of more
for your wire rope dollar . . . the sign of a VALUABLE "FIND."

ACCO *In Business for Your Safety*

AMERICAN CHAIN & CABLE
HAZARD WIRE ROPE DIVISION

TRADE MARK

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, Odessa, Tex., Pittsburgh, San Francisco, Bridgeport, Conn.

XUM

Moving your rig into new territory?

ONE OF THE FIRST persons you'll want to talk to is the Hughes man. He knows the type of rock bits which have made the best footage in the various formations you'll be running in. The Hughes service organization is the only one which covers *consistently* all of the active oil fields in the U. S. and Canada wherever rotary drilling is done.

There were more than 2,000 rigs running in this area last year and practically every one was contacted at least twice a week by a Hughes field man! Hughes field representatives drove over 8,000,000 miles last year to make this record possible!

The Hughes men visit more rigs more times. That is the reason Hughes knowledge of special drilling conditions and rock-bit development in the field leads all competitors. This knowledge is available to you, of course, at any time. We invite you to make use of it.

TRI-CONE ROCK BITS

HUGHES

TOOL COMPANY

HOUSTON, TEXAS

World Standard of the Industry